VOL. 35, PART 2 JUNE 1952

The British Mycological Society

(Recognosce notum, ignotum inspice)

TRANSACTIONS

Edited by
P. H. Gregory, W. C. Moore
and G. C. Ainsworth

CAMBRIDGE UNIVERSITY PRESS
LONDON: BENTLEY HOUSE, N.W.1
NEW YORK: 32 EAST 57th STREET, 22

OFFICERS AND COUNCIL FOR 1952

President

A. A. PEARSON, F.L.S.

Vice-Presidents

W. C. MOORE, M.A.
G. C. AINSWORTH, B.Sc., Ph.D., F.L.S.
P. H. GREGORY, D.Sc., F.L.S.

Secretary

C. J. HICKMAN, B.Sc., M.Sc., Ph.D.
Department of Botany, The University, Edgbaston, Birmingham, 15

Foray Secretary

G. SMITH, M.Sc., F.R.I.C.
London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C. 1

Treasurer

W. BUDDIN, M.A.
Chiltern Court, St Peter's Avenue, Caversham, Reading, Berks.

Editors

P. H. GREGORY, D.Sc., F.L.S.
Rothamsted Experimental Station,
Harpenden, Herts.

G. C. AINSWORTH, B.Sc., Ph.D., F.L.S.
University College,
Exeter, Devon

Council

The OFFICERS with the following in addition:

J. BROOKE
M. B. ELLIS
F. B. HORA
Miss F. JOAN MOORE
P. D. ORTON
N. F. ROBERTSON
I. F. STOREY
Mrs M. P. TOPPING
J. WEBSTER

B. BARNES, Prof. W. BROWN, A. D. COTTON, Prof. Dame HELEN GWYNNE-VAUGHAN, J. RAMSBOTTOM, E. W. SWANTON, Miss E. M. WAKEFIELD, M. WILSON.

PLANT PATHOLOGY COMMITTEE

Chairman

S. D. GARRETT, M.A., Sc.D., D.I.C.

Secretary

C. C. V. BATTS, B.Sc., Ph.D.
National Institute of Agricultural Botany, Huntingdon Road, Cambridge

J. COLHOUN
S. H. CROWDY
W. J. DOWSON
Miss L. E. HAWKER
S. J. HUGHES
P. H. GREGORY
E. C. LARGE
E. LESTER
Miss M. NOBLE
P. H. WILLIAMS

THE PRESIDENT and the SECRETARY *ex officio*

Recorder

(new British species and records)
M. B. ELLIS, B.Sc., Ph.D.
Commonwealth Mycological Institute, Ferry Lane, Kew, Surrey

The subscription price is 50*s*. per volume (post free), or $8.50 in U.S.A., payable in advance. Subscriptions may be sent to any Bookseller, or to the Cambridge University Press, Bentley House, 200 Euston Road, London, N.W. 1.

Enquiries from the U.S.A. should be addressed to the Cambridge University Press, American Branch, 32 East 57th Street, New York 22.

NEW RECORDS AND OBSERVATIONS. V

By A. A. PEARSON, *Hindhead, Surrey*

(With Plates 2 and 3 in colour)

Descriptions are given of fifty-four species of the Agaricaceae, and one *Boletus* recorded as additional to Pearson and Dennis's 'Revised List of British Agarics and Boleti', *Trans. Brit. mycol. Soc.* **31**, 145–190, 1948. Fifteen species are illustrated in colour, including the following new species: *Lepiota pinguipes*, *Collybia griseospora*, *C. ferruginella*, *C. paupertina*, *Omphalia roseotincta*, *Pluteus lepiotoides* and *P. splendidus*. The following new combinations are made: *Hygrophorus* (*Hygrocybe*) *Langei* (Kühner), *Psathyrella fatua* (Fr.), *P. fusca* (Schum. ex Lange), and *P. pygmea* (Bull. ex Fr.).

The numerous records in this paper owe much to the activities of a number of keen collectors who have sent me their specimens to determine or to confirm their own identification. All the species are additions to the 'Revised List of British Agarics and Boleti', by Pearson and Dennis (*Trans. Brit. mycol. Soc.* **31**, 145–190 (1948)). Some that were excluded from the list are reinstated. Exsiccata of the new species have been deposited in the Herbarium, Royal Botanic Gardens, Kew. I have to thank several distinguished mycologists who have kindly replied to my queries about groups to which they have devoted special study.

Lepiota pinguipes n.sp. (Pl. 2, fig. 1).

Cap 1–5 cm., with thick flesh, semiglobate or campanulate, white, then grey or brownish grey, covered with dense silky fibrillose scales, margin usually shaggy. *Gills* very crowded, ventricose or linear, free with well-defined narrow or wide collarium, mostly one length, edge rather blunt, eroded. *Stem* 4–6 cm. long, 5–15 mm. thick above, strikingly ventricose acuminate below, white silky fibrillose, hard, solid except for narrow hollow channel in centre. *Ring* superior, sheathed above, at first involute and smooth, then spreading and with shaggy edge, mobile, white. *Flesh* white, turning grey or with a slight pink flush. *Smell* strong or faint, pleasant. *Taste* mild, rather rancid. *Spores* in mass white, elliptical, rounded both ends with short lateral apiculus, with or without guttule, $6–8 \times 4–4\frac{1}{2}\,\mu$, turn red in iodine; no germ pore visible. *Gill edge* sterile with large cylindrical or clavate thin-walled cystidia, $30–50 \times 12–16\,\mu$. *Cap surface* with septate hyphae $6–15\,\mu$ thick.

Habitat: in sand, Braunton Burrows, North Devon. First found by Dr F. R. Elliston Wright, September 1945, and since gathered every year, often in abundance.

(Section: *Ovisporae.*)

Lepiota pinguipes Pearson, gregatim in arena prope mare, autumno 1945–50, Braunton, N. Devon. *Pileus* 1–5 cm. carnosus, semi-globatus vel gibbosus, albus dein canescens vel brunneo-griseus, squamulis fibrillosis albis densis obtectus, margine plerumque villoso. *Lamellae* confertissimae, ventricosae vel lineares, liberae collario lato v. angusto, plerumque aequales, albae, acie fimbriata. *Stipes* 4–6 cm. longus, sursum 5–15 mm.

Vol. 35, *Part* 1*: issued* 27 *March,* 1952.

crassus, deorsum valde obesus, ad basim acuminatus radicans, albus, sericeofibrillosus, firmus, cavus. *Annulus* membranaceus, amplus, superus, simplex, margine lacerato, mobilus, albus. *Caro* alba dein canescens vel tenuiter roseo-tincta, medulla stipitis alba. *Sapor* mitis aliquantulum rancidus. *Odor* debilis vel fortis, gratus. *Sporae* ellipticae 6–8 × 4–4½ μ laeves, iode ope rubrae; in cumulo albae. *Cystidia* in acie lamellarum cylindrica v. clavata 30–50 × 12–16 μ. *Cutis* pilei ex hyphis 6–15 μ dia. composita.

As kindly pointed out (*in litt.*) by M. Josserand and M. Locquin, the above is closely related to *L. macrorhiza* Locq. but differs in many respects. The large cystidia led me into the error of confusing it with *L. serena* and the description in *Trans. Brit. mycol. Soc.* **32**, 258, must be modified as follows.

Lepiota serena Fr. sensu Kühner in *Bull. Soc. mycol.* Fr. **52**, 213, 1936. (Pl. 2, fig. 2.)

Cap 3–4 cm., subfleshy, campanulate with broad blunt umbo, pure white, silky, radially innately fibrillose, margin striate when young. *Gills* crowded, free without collar, unequal, linear white, edge serrulate. *Stem* 4–7 cm. long, 3½–5 mm. thick, clavate gradually thickening to base, striate-fibrillose silky, hollow, base with round or slightly marginate bulb. *Ring* sheathing from below, erect, edge smooth. *Flesh* pure white, unchangeable. *Taste* mild. *Smell* none. *Spores* white, reddish in iodine, subamygdaloid with oblique apiculus, 7–8 × 3½–4½ μ, without germ pore. *Gill edge* with broad tufted clavate cystidia 15–18 μ wide, some with rough apex. *Cap surface* with closely agglutinated narrow hyphae.

Habitat: roadsides and the edge of leafy woods, Braunton, North Devon, September 1946, *legit* F. R. E. Wright, among nettles, Donhead, Wiltshire, 16 October 1949, *legit* T. W. Dunston.

(Section: *Ovisporae.*)

Prof. R. Kühner has kindly confirmed the determination of this species, which is quite distinct from *Lepiota serena* sensu Lange. The latter has been identified with *L. sericea* Cool by H. S. C. Huysman.

Lepiota sub-alba Kühner in *Bull. Soc. mycol. Fr.* **52**, 233–234, 1936 = *L. albo-serica* Lange non Hennings, *Fl. Ag. Dan.* **1**, 32 (pl. 12B).

Cap 2–3½ cm., campanulate with or without broad obtuse umbo, white or cream sometimes with ochraceous centre, cuticle breaking either into minute flocculose squamules or into larger patches. *Gills* subdistant, ventricose, adnexed or just free, white or cream. *Stem* 2½–4½ cm. long, 1½–3 mm. thick, equal, white above, flushed ochre below and with white rhizoid hairs at base, finally pinkish buff, when quite fresh covered with delicate whitish, silky, fibrils, hollow. *Partial veil* white often leaving remnants on cap margin but rarely visible on stem. *Flesh* white in cap, hyaline white in stem then buff with white pith. *Taste* mild but nasty. *Smell* strong, rather like *L. cristata*. *Spores* truncate with lateral spur, 7–9 × 3½–4 μ, smooth. *Basidia* 4-spored. *Gill edge* sterile packed with cylindrical or clavate hairs 5–7 μ wide. *Cap surface* hyphoid.

Habitat: under trees or shrubs or in grass, *legit* P. Orton, October 1950, Norbury Park, Mickleham, Surrey.

(Section: *Stenosporae.*)

Tricholoma persicinum Fr.

Cap 2–5 cm., convex then depressed sometimes with blunt umbo, flesh pink or buff, smooth polished; margin opaque, incurved at first, cuticle peels. *Gills* crowded, broad, arcuate, linear or ventricose, adnate emarginate, unequal, white. *Stem* 5–7 cm. long, 5–10 mm. thick, equal or slightly swollen at base, white, smooth, innately fibrillose, firm, solid then hollow. *Flesh* white. *Taste* mild, rancid. *Smell* pleasant (rather fragrant) then rancid. *Spores* in mass; white. *Spores* elliptic, smooth, non-amyloid, mostly 5 × 2½ (4½–6 × 2½–3 μ). *Gill edge* fertile; no cystidia. *Cap cuticle:* septate hyphae mostly 10–12 μ, length between septa short.

Habitat: in troops under larch, 18 September 1948, Braunton, North Devon, *legit* F. R. Elliston Wright. On thick carpet of needles in young fir plantation, Hillsborough, Northern Ireland, 17 September 1948, during fungus foray of the British Mycological Society, *legit* John Brooke.

(Section: *Variecolorata.*)

Tricholoma odoratum (Cool) Konrad & Maublanc, in *Les Agaricales, Encycl. Myc.* **14**, 346, 1948 = *Lepiota odorata* Cath. Cool in *Med. Nederl. Myc. Ver.* **9**, 47–52 (pl. 1), 1918 = *Coolia odorata* (Cool) Huysman in *Med. Nederl. Myc. Ver.* **28**, 54–60, 1943. (Pl. 3, figs. 1, 2.)

Cap 2½ cm. (1½–4 cm.), convex then nearly flat, dry, greyish or violaceous lilac with dark purplish erect scales on disk (cuticle breaks up into concentric squarrose scales like a *Lepiota*). *Gills* distant, ventricose, adnate emarginate, whitish (or lilaceous). *Stem* 5–6 cm. long, 5 mm. thick, swollen below to about 8 mm. and with fusoid base (1–3·5 cm. long, 5–10 mm. thick, swollen below in subglobose bulb), violaceous lilac above, yellow below with dark purplish scales in middle. *Flesh* violaceous in cap, paler in stem and yellow at base. *Spores* in mass white (*sec.* Schweers), under microscope hyaline or with slight yellow tint, broadly ovoid, apiculate 7–8(9) × 4½–5 μ (5–9 × 4–6), stain reddish brown in iodine. *Gill edge* fertile. *Basidia* 4-spored. *Taste*(?). *Smell* (strong and pleasant).

Habitat: among grass under Scots Pine, Rothiemurchus, Scotland, 24 September 1950; collected by R. W. G. Dennis.

(Place under new sectional heading of *Tricholoma: Coolia* Huysman)

Except for the additions in brackets taken from the paper by Miss Cath. Cool, the above is a description of the Scottish specimens which differ from the type in having a fusiform nonbulbous base. The species has been found in Holland on several occasions. At the base of the stem, half buried in the ground, Dutch collections usually have numerous sclerotoid bulbs varying in size from a pea to a hazel nut, yellow inside and out. Dr H. S. C. Huysman, who kindly confirmed our determination, has studied these sclerotia, and he suggests that the Scottish specimens have used up the sclerotium and this may account for the fusoid base.

On Pl. 3, fig. 1, will be found a water-colour sketch of the Scottish specimens drawn by Dr Dennis, who has also copied a group (Fig. 2) from Miss Cool's plate in order to show the difference between what perhaps may be called the more normal form with spherical sclerotia at the stem base, and the form with fusoid stem.

Clitocybe osmophora Gilbert in *Bull. Soc. mycol. Fr.* **51**, 115, 1935.

Cap 2–4 cm., fleshy, hygrophanous, convex umbilicate, dark brown, paler when dry, smooth, naked, polished, margin incurved, regular or wavy, opaque, extreme edge with thin white line. *Gills* very crowded, arcuate or ventricose, unequal, subdecurrent, thin, fuliginous-grey with slight olive tint, edge white. *Stem* 3–4 cm. long, 3–5 mm. thick, cartilaginous, colour of cap, white pruinose when fresh, base with white tomentum. *Flesh* white. *Taste* mild but rather unpleasant. *Smell* strong of rotten pears, like *Inocybe pyriodora*. *Spores* white, ovoid apiculate, $4–4\frac{1}{2} \times 2\frac{1}{2}–3\,\mu$, smooth. *Cystidia* none. *Cap surface* with narrow hyphae about $2\,\mu$ with clamp connexions.

Habitat: under larch, 15 October 1950, Banstead, Surrey, *legit* P. Orton.

(Section: *Hygrophanae, subdecurrentes.*)

Clitocybe orbiformis Fr.

Cap 1–3 cm., convex or gibbous, fleshy, hygrophanous, dark horny grey drying to hyaline grey with darker centre, rather brittle, smooth, mat, margin not striate, white veil visible on margin. *Gills* crowded, arcuate, narrow, subdecurrent, thin, white then pale grey, edge smooth. *Stem* 2–5 cm. long, 3–5 mm. thick, equal or slightly thicker above, soft, hollow, fairly firm, striate with white fibrils, blackish with handling. *Flesh* horny, hyaline, grey, gelatinous, drying to white. *Spore powder* white. Spores elliptical, $6–7\frac{1}{2} \times 3\frac{1}{2}–4\,\mu$, smooth non-amyloid. *Gill edge* fertile. *Basidia* 4-spored. *Cap surface* with long hyphae $5–7\,\mu$ wide.

Habitat: in larch and Douglas fir wood, Gomshall, Surrey, 17 November 1950.

This species is replaced in the British list. I am indebted to Mr George Metrod for identifying it.

(Section: *Hygrophanae, subdecurrentes.*)

Mycena osmundicola Lange var. **Imleriana** Kühner in *Le Genre Mycena*, p. 210, 1938.

Cap 4–7 mm., membranous, oblong at first then campanulate covered with white meal over a dark olive background, radially grooved. *Gills* (subdistant narrow, grey or) slightly olive-yellow, edge flocculose. *Stem* filiform, thicker towards base and densely covered with white hairs. *Spores* white elliptic apiculate, $8–9 \times 5\,\mu$, smooth, amyloid. *Gill edge* sterile with clavate cystidia $9–12\,\mu$ wide, ornamented with minute warts or spines. *Stem* clothed with cylindrical hairs up to $250\,\mu$ long, $8–10\,\mu$ thick, densely warted. *Cap surface* with subspherical cells having finger-like offshoots all densely warted. Trama purplish brown in Melzer's solution.

Habitat: in fibre in pot of *Cattleya*, *legit* R. W. G. Dennis in Royal Botanic Gardens, Kew, 9 May 1950.

The above details were noted by Dr Dennis, and agree substantially with the *Mycena* described by Imler in *Bull. Soc. mycol. Fr.* **52**, Atlas, LXX, 1936, which differs from the type in the complicated shapes of the granules on the cap.

Mycena salicina Vel. in *Česke Houby*, p. 306, 1920, and R. Kühner, *Le Genre Mycena*, p. 620, 1938. For Latin diagnosis see Pilát, *Velenovskyi Species Novae Basiomycetum*, p. 94, 1948.

Cap 10–15 (25) mm., membranaceous, convex then plane, with or without papillate umbo, grey with blackish centre, striate by transparence when moist, smooth, mat (sometimes minutely punctate). *Gills* subdistant, ventricose, broad, unequal, broadly adnate breaking free, whitish, rather thick, edge smooth or fimbriate. *Stem* 3–4 cm. long, 1½–2 mm. thick, filiform, slightly thicker above, white, gradually darkening, especially at base, covered with a white pubescence. *Flesh* blackish in cap, white in stem. *Taste* mild. *Smell* none. *Spore powder* white. *Spores* globose with prominent apiculus, smooth, non-amyloid. 5–5½ μ without apiculus. *Cystidia* on gill edge long and slender, flask-shaped, 60–70 × 10–15 μ below, 4–6 μ on neck.

Habitat: larch wood in troop, Banstead, *legit* P. Orton, 15 October 1950.

In spite of its name, this *Mycena* is not exclusively attached to the willow. Dr R. Kühner, who kindly determined it, has found it on the ground in pine, spruce and mixed woods. (Kühner placed *M. salicina* in the section *Mycenella* which was originally introduced by Lange for *Mycena* species with round warted spores. In our own rough arrangement we would place it under *Albidulae*.)

Mycena clavularis (Batsch) Fr. *sensu* Kühner (*non* Lange) in *Le Genre Mycena*, p. 181, 1938.

Cap 2–6 mm., very thin, convex, hyaline white or greyish, striate, minutely but densely pubescent *sub lente*. *Gills* distant and sparse, white or greyish white with white edge, ventricose, breaking free and often adhering to each other near stem in a pseudo-collarium. *Stem* 4–10 mm., thread-like, equal, hyaline, polished, with a small basal, hairy, fugacious disk. *Spores* globose or broadly elliptic with short apiculus, smooth, amyloid, 8–10 μ, *sec.* Kühner. Spore prints of our specimens were taken on glass slides; most of the spores were globose, about 8 μ, but there were some larger ones, 10–11 × 7–8 μ. Slender hairs may be found on the gill edge but they are very fugacious and we did not observe them.

Habitat: on bark, usually at the mossy base of living trees, Mickleham, Surrey, November and December 1949, *legit* P. Orton.

This minute *Mycena* is probably common but easily overlooked. It is due to Mr Peter Orton's careful and persistent field work that we are able to add it to the British list.

(Section: *Basipedes*.)

Mycena pseudo-pura Kühner (*non* Cooke) in *Le Genre Mycena*, p. 451, 1938.

Cap 1–2½ cm., usually small, convex truncate then almost flat, submembranaceous, hygrophanous, pale buff or brown with violaceous tint, smooth, mat, extreme margin striate when fresh. *Gills* crowded to subdistant, linear or wedge-shaped, adnate with decurrent tooth, rather thick, white with violaceous tint, edge eroded or crenulate. *Stem* 3–6 cm. long, 1–1½ mm. thick, fairly rigid, equal or slightly thinner above, pruinose at apex, violaceous when fresh, paler when old, pubescent at base and with long very fine root-like fibres. *Flesh* lilaceous, or whitish in cap. *Taste* mild, slightly rancid. *Smell* faint of radish. *Spores* pip-shaped, 5–7 × 3½–4½ μ, smooth, non-amyloid (colourless in iodine). *Gill edge* sterile, lined with clavate or cylindrical cystidia, 9–15 μ wide, often in tufts. The cap flesh is pseudo-amyloid, the hyphae turning reddish in Melzer's solution. This is best seen directly under the cover-slip rather than under microscope.

Habitat: in troops on the ground under spruce, often in tufts; collected by F. R. Elliston Wright at Spreacombe, North Devon, August and September 1949.

The type specimens of *Mycena pseudo-pura* Cooke at the Herbarium, Royal Botanic Gardens, Kew, have amyloid spores and may be considered as one of the many forms of *M. pura* (Pers.) Fr. For the present, the above can be left in the British list as *pseudo-pura*, but the name will have to be changed eventually. Alex. H. Smith in *North American Species of Mycena*, p. 190, 1947, has suggested that it may be the same as his *M. Kuehneriana*, but the spores of this species are distinctly amyloid.

Collybia griseospora n.sp. (Pl. 2, fig. 4.)

Cap 1–2 cm., hygrophanous, shallow convex, honey colour then buff, smooth, margin faintly striate by transparence when fresh. *Gills* crowded, unequal, thick, linear or ventricose, adnate, pale creamy buff. *Stem* 2–3 cm. long, 2 mm. thick, smooth, polished, honey colour, fairly tough. *Flesh* honey colour. *Taste* mild, rancid. *Smell* none or faint. *Spore powder* grey (Drab of Ridgway). *Spores* virguliform, 6½–7½ × 3½–4 μ, 1 guttulate with irregular rugulose surface, non-amyloid. Sometimes smooth in fresh spores. *Cystidia* cylindrical on gill edge, about 60 × 3 μ.

Habitat: on the ground, in troop, Vaynol Park, Bangor, North Wales, mixed wood, 11 September 1950.

(Section: *Tetrophanae.*)

This species is remarkable for the grey tint and the irregular roughness of its spores, which are very like those of *Collybia nitellina*.

The spores of *C. nitellina* differ in having a pinkish tint. The microscopic features are also different.

Collybia griseospora Pearson, in silvis mixtis, Vaynol Park, Bangor, North Wales, 11 Sept. 1950. *Pileus* 1–2 cm. hygrophanus, convexo-planus, glaber, melleus, margine primum leviter striato. *Lamellae* confertae, inaequales, crassae, lineares vel ventricosae, adnatae, pallide luteolae. *Stipes* 2–3 cm. longus, 1–2 mm. crassus, subcartilagineus, glaber, politus, melleus. *Caro* mellea. *Sapor* mitis rancidus. *Odor* vix sensibilis. *Sporae* rugulosae, virguliformes 6½–7½ × 3½–4 μ, 1-guttulatae, non amyloideae; in cumulo griseae. *Cystidia* cylindrica in acie lamellarum circa 60 × 3 μ.

Collybia ferruginella n.sp. (Pl. 3, fig. 4.)

Cap 1½–2 cm., convex then flat or upturned, hygrophanous, dark reddish brown when moist, paler when dry, smooth, innately fibrillose, margin striate, regular or undulate. *Gills* distant, 2–3 mm. wide, ventricose, unequal, adnate then free, brown, powdered with white spores, thick, edge blunt and smooth. *Stem* 2–3 cm. long, 2–3 mm. thick, central or excentric, dark reddish brown covered with white pruine when fresh, smooth, polished, fairly firm. *Flesh* thin, buff in cap, dark brown in stem. *Taste* mild. *Smell* none. *Spore powder* pure white. *Spores* broadly elliptical 7–8 × 6 μ, apiculate verrucose, with cylindrical blunt warts; non-amyloid. *Gill edge* fertile. No cystidia. *Cap surface* with septate hyphae 12–24 μ diameter.

Habitat: on bank near lake, Waggoners Wells, Hampshire, 4 September 1948.

(Section: *Laevipedes* Fr.)

Collybia ferruginella Pearson, gregaria in terra prope lacum Waggoners Wells, Hampshire, 4 Sept. 48. *Pileus* 1½–2 cm., tenuis, convexus dein expanso-depressus, obscure ferrugineus, siccus pallidior, glaber, innate fibrillosus; margine striato regulare vel undulato. *Lamellae* distantes 2–3 mm. latae, ventricosae, inaequales, adnatae dein liberae, brunneae, sporis albis pulverulentae, crassae, acie obtusa et laevi. *Stipes* 2–3 cm. longus, 1½–2 mm. crassus primitus pruina alba tectus, glaber, politus, firmulus. *Caro* pilei lutea, stipitis obscure brunnea. *Sapor* mitis. *Odor* nullus. *Sporae* late ellipticae, apiculatae, verrucosae 7–8 × 6 μ non amyloideae; in cumulo albae. *Cystidia* nulla. *Cutis* pilei ex hyphis 12–24 μ composita.

Collybia paupertina n.sp. (Pl. 2, fig. 5)

Cap 5–20 mm., conico-campanulate with prominent blunt umbo, light mouse grey covered with a dense white pubescence; margin incurved at first, upturned when old, sometimes plicate. *Gills* subcrowded, light buff, ventricose or linear, adnate then free, unequal, up to 2 mm. wide, edge smooth. *Stem* 2–4 cm. long, 1–3 mm. thick, equal, terete or compressed, smoky grey or blackish, often pallid above, striate, pubescent, white tomentose at base. *Flesh* buff in cap, horny grey in stem with a whitish pith. *Taste* rancid. *Smell* strong of new meal. *Spore powder* white. *Spores* elliptical apiculate, 5½–6 × 3–3½ μ, smooth, non-amyloid. *Gill edge* fertile. No cystidia. *Basidia* 4-spored with long sterigmata. *Cap surface* with hyphae 8–10 μ wide.

Habitat: in troops on ground among nettles and dog's mercury in mixed deciduous wood, Buckland Woods, Braunton, North Devon, 5 November 1947 and 25 October 1951, *legit* F. R. Elliston Wright.

(Section: *Tetrophanae.*)

Collybia paupertina Pearson, gregatim in terra in silvis deciduis mixtis; 5 Nov. 47 et 25 Oct. 51, Buckland Woods, Braunton, N. Devon. *Pileus* 5–20 mm. carnosulus, conicus umbone obtuso pallide luteus, minute sed dense pubescens, margine interdum plicato. *Lamellae* subdistantes, pallido-luteae, inaequales, adnatae dein liberae, lineares vel ventricosae. Stipes 2–4 cm. longus, 1–3 mm. crassus, aequalis, firmulus, elasticus, cinereus, pruina flocculosa tectus, ad basim tomento albo praeditus. *Caro* pilei lutea, stipitis corneo-grisea. *Sapor* rancidus. *Odor* farinarius. *Sporae:* in cumulo albae, ellipticae, laeves, 5½–6 × 3–3½ μ, non amyloideae. Acies lamellarum fertilis. Cystidia nulla. Basidia tetraspora. Cutis pilei ex hyphis 8–10 μ dia. composita.

Marasmius eufoliatus Kühner in *Bull. Soc. mycol. Fr.* **43**, 110, 1927, and *Le Botaniste*, **25**, 94, 1933 = *M. recubans* Quél. *sensu* Lange in *Dansk Bot. Arkiv.* **2**, (11), p. 21, 1921 and *Fl. Ag. Dan.* **2**, 27 (pl. 48E), 1936.

Cap 3–4½ mm., semiglobose then convex, more or less umbilicate, striate-sulcate, white. *Gills* distant, fairly broad, unequal, arcuate, white. *Stem* thread-like, straight or flexuose, white above, brownish below at first with a delicate fugacious pubescence. *Spores* white, ventricose fusoid, pointed both ends, 10–14 × 4½–6 μ, smooth. *Cystidia* on gill edge cylindrical subcapitate or slightly ventricose, 40–60 × 7–10 μ. *Cap surface* with erect cells of different shapes, sack-shaped, clavate, subcylindrical, mixed with a few flask-shaped cystidia.

Habitat: on the stalks of beech leaves, Norbury Park, Mickleham, Surrey, collected by Mr P. Orton, October 1950 (also to be found on the stalks of other leaves, oak, sallow, etc.)

(Section: *Mycenoides* (*a*) *Ramealini.*)

This common species has been overlooked because, when growing on beech leaves it is often accompanied by *Mycena capillaris* which usually grows on the flat leaf, whereas *Marasmius eufoliatus*, with much the same appearance, is found on the stalk only. *M. recubans* Quél. also grows on the stalks of beech leaves but, according to Quélet, it has small elliptical spores about 6–7 μ long.

Marasmius Cauvetii Maire & Kühner in *Ann. Soc. linn. Lyon.* **79**, 1936. (Pl. 3, fig. 8.)

Cap 2–4 cm., convex then flat or depressed, elastic, reddish ochre, paler at margin, striate, often undulate. *Gills* subdistant or crowded, unequal, linear, ventricose or wedge-shaped, adnate breaking free, white then pale buff, edge smooth, straight or wavy, rather thick. *Stem* 3–7 cm., often compressed and grooved, equal or thickened above, often pointed at base, pale ochre at apex, brownish black or jet black elsewhere, cartilaginous, smooth, when young covered with a white pruine, hollow. *Flesh* fairly thick, watery ochre in cap, black or dark brown in stem. *Taste* mild but unpleasant. *Smell* strong and foetid with suggestion of garlic when fresh; smell absent in exsiccata. *Spore powder* white. *Spores* pip-shaped, 5½–6 × 3–3½ μ, smooth, non-amyloid. *Gill edge* fertile. *Basidia* 4-spored. Cap cuticle with hyphae 4–12 μ thick, with occasional clamp-connexions.

Habitat: in dense tufts on old sawdust, Reading, October 1949, collected by Prof. T. Harris and Dr F. B. Hora.

(Section: *Alliodori.*)

This species was originally found in Algeria growing on debris of *Casuarina*. Three weeks after the Reading specimens were sent to me by Dr Hora, I found *Marasmius Cauvetii* in Portugal also growing in large quantities on rotted sawdust, so it is probably a fairly common species in Europe hitherto overlooked. I am indebted to Dr R. Kühner, one of the authors of the species, for identifying it.

Marasmius littoralis Quél. (1879) = *M. epodius* Bres. (1881).

Cap 4–15 mm., thin, convex, umbonate or umbilicate with central papilla, radially grooved, pinkish buff or buff, darker in centre; margin slightly incurved, crenulate. *Gills* distant, ventricose, adnexed or free but without collarium, veined at base, equal, white then pale buff. *Stem* 3–4 (7) cm. long, about 1 mm. thick, hollow, smooth, horny, white above, dark bay brown below, equal, with small bulb at base covered with white tomentum. *Flesh* white or pale buff. *Taste* not noticed, bitter (*sec.*

Battetta in *Bull. Soc. mycol. Fr.* **1**, 18–67). *Smell* none. *Spores* in mass, white, hyaline under microscope, non-amyloid, club-shaped subfusoid, 13–20 (28) × 4–5 μ. *Basidia* 4-spored. *Cystidia* on gill edge and face variable in shape and size, crowned with warts. *Cap cuticle* with globose or ovoid cells also with brush-like warts.

Habitat: on old grass. Found by F. C. Hassell in sand on marram grass, North Bull Island, Dublin, 10 October 1949 (*fide* Miss Wakefield), and again 20 September 1950.

(Section: *Androsaceus.*)

This species with its long subfusoid spore may have been confused with *M. epiphylloides* Rea, which usually grows on ivy and has smooth cylindrical capitate cystidia on gills, the brush-like cells only being on the cap surface.

Omphalia roseotincta n.sp. (Pl. 2, fig. 7.)

Cap 1–4 cm., subfleshy, hygrophanous, convex or flat, umbilicate, pale pink drying to white, elastic, smooth, mat, cuticle not peeling, margin incurved at first, crenulate, often plicate, striate when moist, opaque when dry. *Gills* crowded, very narrow, arcuate or linear, decurrent or subdecurrent, unequal, elastic, rather thick, pale pink, edge smooth. *Stem* central or excentric, 2–5 cm. long, 2–5 mm. thick, very cartilaginous, equal or tapering to an acuminate base, with tuberous swelling at apex near gills, hollow, white or pink sometimes yellowish when old. *Flesh* white. *Taste* mild, rancid after mastication. *Smell* pleasant (not mealy). *Spore powder* white. *Spores* broadly ovoid, 5½–6 × 3½–4 μ, smooth, non-amyloid. *Gill edge* fertile. *Basidia* 30–35 × 5½–6 μ, 4-spored. No cystidia. *Cap surface* with closely intertwined hyphae 5–6 μ thick.

Habitat: in troops on ground or attached to sticks, Norbury Park, Mickleham, Surrey, in beech wood near or under fallen yew tree. October 1950, collected by Peter Orton.

(Section: *Graciles, albidae.*)

Omphalia roseotincta Pearson gregatim in terra vel in fragmentis ligni, Mickleham, Surrey, in silva faginea prope *Taxum baccatam*; Oct. 1950. *Pileus* 1–4 cm. tenuis, hygrophanus, elastico-gelatinosus, convexo-umbilicatus, primum roseolus dein albus, glaber, impolitus; margine primitus incurvato, crenulato, saepe lobato, udo striato, sicco opaco. *Lamellae* confertae, angustissimae, lineares, decurrentes vel subdecurrentes, inaequales, elasticae, roseolae, acie laevi. Stipes 2–5 cm. longus, 2–5 mm. crassus, supra incrassatus et apice tuberculo turgescens, cartilagineus, cavus, roseolus dein albus, aequalis vel saepius basim versus attenuatus. *Caro* alba. *Sapor* mitis dein rancidus. *Odor* gratus. *Sporae* late ellipticae, 5½–6 × 3½–4 μ non amyloideae; in cumulo albae. Acies lamellarum fertilis. *Cystidia* nulla. *Basidia* tetraspora 30–35 × 5–5½ μ. *Cutis* pilei ex hyphis dense agglutinatis 5–6 μ dia. composita.

Hygrophorus (*Hygrocybe*) **Langei** (Kühner) n.comb., *Hygrocybe Langei* Kühner, *Le Botaniste*, Sér. **18**, p. 7, 1927 = *Hygrocybe constans* Lange non Murrill, in *Dansk Bot. Arkiv*, **4** (4), 24, 1923 and *Fl. Ag. Dan.* **5**, 24 (pl. 167 C), 1940 = *Hygrocybe obrussea* Fr. sensu Ricken = *Hygrophorus Rickenii* Maire (1930).

Cap 3–6 cm. long, conical with acute umbo, viscid, golden or lemon yellow or bright orange red, radially striate with innate fibrils, not turning black, margin often lobed when fully expanded. *Gills* subdistant, ventricose, rather broad, adnate, golden or lemon yellow. *Stem* 5–7 cm. long, 5–7 mm. thick, equal, terete or compressed, lemon yellow, white below, hollow. *Flesh* golden yellow or reddish in cap, lemon in stem, white at base. *Taste* mild. *Smell* none. *Spore powder* white. *Spores* cylindrical, slightly curved with oblique apiculus, 10–12 × 5½–6½ μ, smooth. *Basidia* 2-spored (sometimes 3-spored, *sec.* Kühner), sterigmata 6–7 μ long.

Habitat: roadsides, edge of woods, sand dunes, etc. North Bull Island, Ireland, September and October 1948, *legit* F. C. Hassell; Gomshall, Surrey, August 1950, P. Orton; and Newborough Warren, Anglesey, September 1950.

(Section: *Hygrocybe* Fr. (*a*) *Conici* Bat.)

There is some doubt as to the correct name for this species. It has been referred to *Hygrophorus croceus* Bull. sensu Bres. It is certainly not Bulliard's species which blackens; to quote his words in *Champ. de la France*, **2** (2), 554, '*il devient ensuite presque tout noir*'. Bresadola's figures of *H. croceus* on plate 348 in *Icon. Myc.* may represent Lange's species, but Bresadola gives 4 sterigmata to the basidium. As Lange's epithet *constans* had been used by Murrill in *Mycologia* (1912) for another species, it must be replaced by the name given to it by Kühner.

Russula cessans Pearson in *The Naturalist*, p. 101, July-September 1950. (Pl. 3, fig. 5.)

Cap 3–7 cm., convex then plano-depressed, viscid, mat when dry, dark crimson or dull violaceous purple with blackish centre, sometimes with brown tint, often with minute cracks, cuticle half peeling; margin smooth or inconspicuously striate-tuberculate in large specimens. *Gills* crowded or subdistant, white at first, then cream, finally ochraceous, adnexed sometimes emarginate, arcuate or cuneiform, rounded in front, equal or with a few short ones, occasionally forked. *Stem* 3–5 cm. long, 1–2 cm. thick, subequal, firm, white, finely veined. *Flesh* white, unchangeable; reaction to iron sulphate ($FeSO_4$) salmon pink. *Taste* mild. *Smell* faint or none. *Spores* in mass bright ochraceous (G of Crawshay's Spore Colour Chart), subglobose, amyloid, warted and partly reticulate with thick and thin lines, 8–9½ × 7½–8 μ. *Cystidia* on gill edge, sparse, fusoid, 7–9 μ wide, staining blue-black in sulphovanillin (SV). *Pileocystidia* sparse, 4–6 μ thick at apex with long tail and staining blue-black in SV.

Habitat: on ground under *Pinus sylvestris* in troops, Witley Common, Surrey, late autumn, 15–28 November 1949.

The species described above has not been entirely overlooked. It is one of the Russulae involved in the discussion some years ago between the late J. Schaeffer and R. Singer concerning the identity of *Russula Turci* Bres. This matter was briefly dealt with in *Trans. Brit. mycol. Soc.* **22**, 40–42, 1938, when perhaps I expressed myself with unjustified impatience. Dried specimens distributed by Bresadola himself proved to be of several species and this gave rise to much confusion and heated debate. It is hardly necessary to recall the details. Dr Rolf Singer tells me that two of the exsiccata in question are at the Farlow Herbarium, Harvard, and New York Botanical Gardens, the latter being in fact the species now described. Having found this unfamiliar *Russula* growing in abundance under Scots pine, I communicated with several *Russula* experts and all agreed that it was worthy of a new description. I am indebted to the following for so kindly replying to my letters: H. Romagnesi, V. Melzer, Rolf Singer and Richard Crawshay. The last I have to thank for the camera lucida drawings of the spores which greatly enhance the value of the diagnosis.

R. cessans Pears. differs from *R. Turci* Bres. in colour, absence of the characteristic iodoform smell and the presence of cystidia in the cuticle of the pileus. The cystidia on the gills colour blue-black in sulphovanillin, but there is no such blue reaction in those of *R. Turci*.

The nearest relative is *R. capensis* Pears., a description and coloured plate of which appeared in *Trans. Brit. mycol. Soc.* **33**, 299, 1951. The Cape *Russula* grows in a great variety of colours and in vast numbers in the pine woods of South Africa and especially under the stone pine (*Pinus pinea*). The colours of *Russula cessans* are duller, it is not so viscid, the spore powder is very slightly paler and the spore ornamentation a little denser—all rather subtle points which would have less significance if the two species were not separated by a distance of some six thousand miles.

Lactarius Mairei Malençon in *Bull. Soc. mycol. Fr.*, **55**, 34–41 (pl. 1), 1939, var. **zonatus** Pearson in *The Naturalist* July-September 1950. (Pl. 3, fig. 6.)

Cap 5–6 cm., fleshy, convex then depressed, somewhat viscid at first, dark orange buff in centre which is smooth, elsewhere paler with several darker concentric zones and with adpressed or slightly recurved reddish brown scales; margin incurved, covered with shaggy brown hairs. *Gills* crowded, narrow, linear (3–4 mm. wide) mostly one length but some smaller, pale orange buff, adnate subdecurrent, rather thick, edge smooth. *Stem* 4–6 cm. long, 1–1½ cm. thick, orange buff, paler at apex, delicately pubescent when young, smooth or rugulose, equal, firm outside with spongy interior. *Flesh* very pale buff, acrid, with strong but pleasant smell. *Milk* white, copious, unchangeable, very acrid. *Spore powder* when fresh D, when old also D of Crawshay's Spore Colour Chart (Cartridge Buff of Ridgway). *Spores* almost spherical, $7–7\frac{1}{2} \times 6\frac{1}{2}–7\,\mu$, excluding apiculus and surface markings; cristate with partial or complete fairly thick reticulation: the cristate protuberances merge into each other by thin or thick connecting lines. *Basidia* 4-spored. *Cystidia* on gill edge lanceolate, long and very pointed, projecting well beyond gill edge and fairly abundant, blue-black in sulphovanillin; according to Malençon they are sometimes septate near apex. *Scales on cap* with long hyphae, $3–3\frac{1}{2}\,\mu$ diameter, blue-black in SV.

Habitat: in mixed woods probably under oak, West Dean Park Arboretum, Sussex, 30 August 1948.

L. Mairei has not hitherto been recorded for Europe. It was first discovered in 1937 under beech oak (*Quercus faginea*) in the woods of the Atlas Mountains, French Morocco. The above description is from the British specimens and differs from the original diagnosis in several details which are hardly of specific importance. They do, however, call for a varietal epithet. Our specimens were rather brighter in colour, the pileus was distinctly zoned and the spores were slightly smaller though with the same shape and ornamentation. *L. Mairei* var. *zonatus* looks like a brownish *L. torminosus* from which it differs not only in colour but in size and shape of spores and in habitat. It is, however, more likely to be confused with *L. zonarius* from which it can be distinguished by its less robust stature, scaly cap, shaggy margin and paler spore powder.

In the arboretum where it was found, no *Quercus faginea* was seen but other oaks are present: *Q. robur* and several North American species (*Q. velutina*, *coccinea*, *rubra*). At present it is not possible to say with which tree our *Lactarius* was associated.

Lactarius decipiens Quélet in *Fl. Myc.* p. 361, 1888.

Cap up to 6 cm., fleshy, convex soon depressed or umbilicate, sometimes with central pointed papilla, reddish buff or brick-orange, often with rusty spots smooth or very slightly tomentose *sub lente*, not peeling, mat; margin incurved at first, often wavy or plicate, opaque. *Gills* subdistant, 3–7 mm. wide usually narrow, pointed both ends, decurrent unequal, light buff, darker when old and with rusty spots, edge smooth. *Stem* 2–4 cm. long, central or excentric, sometimes equal but more often stoutly obconic, colour of cap, firm, solid or hollow, smooth or rugulose apex often sulcate, pruinose when fresh. *Flesh* white with slight buff tint. *Milk* rather sparse, white, turns yellow on finger or back of hand and stains gills yellowish. *Taste* tardily acrid after mastication. *Smell* pleasant of *pelargonium* when fresh. *Spore powder* creamy (D of Crawshay's chart). *Spores* broadly elliptical, $7–8 \times 5\frac{1}{2}–6\,\mu$, amyloid, ornamentation variable, netted all over with coarse or fine lines. *Cystidia* on gill edge sparse, lanceolate, $50–70 \times 5\,\mu$, blue-black in upper part with sulphovanillin. A few on gill face. No cystidia on cap cuticle.

Habitat: on the ground in troops or solitary, often in tufts, deciduous woods especially beech. Haslemere, Surrey, August–September 1948–50. Gomshall, Surrey, November 1948. Braunton, North Devon, November 1948

(Section: in view of its smell of *pelargonium*, *L. decipiens* can go under *Olentes*).

This species has been confused with *L. hepaticus* Plowr. (= *L. theiogalus* sensu Rea) which is confined to coniferous woods and appears in vast quantities in our pine woods especially late in the year. *L. decipiens* is less common and seems to be confined to leafy woods.

The question as to the identity of *L. theiogalus* is briefly discussed on p. 99 of my short monograph 'The Genus *Lactarius*' (*Naturalist, Lond.* July, Sept., 1950). This name should be withdrawn and replaced by *L. hepaticus* Plowr.

Pluteus plautus (Weinm.) Fr.

Cap 4–6 cm., campanulate with flat umbo then plane, soot black covered with small scales, dense in centre, peels to disk. *Gills* crowded, broad, ventricose, free with rather wide collarium, thin, white then pink, edge crenulate. *Stem* slender, 4–6 cm. long, 3–6 mm. thick, base with submarginate bulb, striate fibrillose and with minute black squamules scattered chiefly on lower part, soft, hollow but fairly tough. *Flesh* white. *Taste* mild. *Smell* none. *Spore powder* Pinkish Cinnamon (Ridgway).

Spores broadly ovoid, 5½–6 × 5 μ, smooth, with granular contents. *Gill edge* with scattered cystidia ventricose or flask-shaped with long or short neck, apex obtuse or acute, 60–90 × 20–35 μ. *Cap surface* with blackish hyphae of varied sizes up to 20 μ wide.

Habitat: on ground in beech wood, Norbury Park, Mickleham, Surrey, 8 October 1949 and 8 October 1950.

(Section: *Depauperati*)

Pluteus caloceps Atkinson in *Ann. mycol.*, *Berl.*, **7**, 373, 1909 = *P. coccineus* (Mass.) Lange, *Fl. Ag. Dan.* **2**, 88 (pl. 72, C), 1936 = *P. leoninus* (Schaeff.) Fr. var. *coccineus* Massee in *Brit. Fung. Fl.* **2**, 290, 1893 = *P. leoninus* in Cke. *Ill.* 313/421 B.

Cap 2–6 cm., fleshy, convex then flat, sometimes umbonate, bright orange-scarlet with patches of lemon, sometimes with subreticulate veins especially in centre, margin regular or undulate. *Gills* crowded, broad, ventricose, free, white at first then flesh pink, edge eroded. *Stem* 3–5 cm. long, 4–10 mm. thick, central or excentric, very pale lemon sometimes with red base, striate fibrillose, often compressed, base slightly bulbous, firm, solid. *Flesh* whitish, pale lemon or golden yellow. *Taste* mild. *Smell* none. *Spore powder* Pinkish Cinnamon. *Spores* broadly elliptic, 5½–6 × 4½–5 μ, smooth. *Gill edge* substerile with pyriform or sack-shaped cystidia 15–20 μ wide. *Basidia* 4-spored. *Cap surface* with globose or pear-shaped cells, hyaline or orange tinted, 25–40 μ wide.

Habitat: on rotten stumps, caespitose. On ash, 30 October 1948, Bookham, Surrey.

(Section: *Micacei.*)

Until recent years, this brilliantly coloured species was linked with *P. leoninus* (Schaeff.) Fr. but it is quite distinct. Apart from the colour, the structure of the cap surface is different; in *P. leoninus* it is made up of elongated hyphae.

(*P. caloceps* Atk. appears in the Revised List as *P. coccineus* (Mass.) Lange, but the American record has priority.)

Pluteus lepiotoides n.sp. (Pl. 2, fig. 8.)

Cap 5–6 cm., fleshy, convex-umbonate or flat, covered with dark brown concentric squamules on white background looking like a *Lepiota*. *Gills* free, very broad, ventricose, pink, edge wavy. *Stem* 4–6 cm. long, 4–5 mm. thick, central or excentric, white turning smoky grey, striate fibrillose, with bulbous acuminate base rooting in sand. *Flesh* white. *Spores* pinkish elliptical, 6½–7 × 5–5½ μ, smooth. *Cystidia* flask-shaped with long neck, apex obtuse, mixed with sack-shaped cells of various sizes. *Cap cuticle* (squamules) made up of thin-walled hyphae with dark brown contents 5–10 μ diameter, septa often very close together.

Habitat: in sand, Braunton Burrows, North Devon, 6 October 1944, collected by Dr F. R. Elliston Wright.

(Section: *Tricholodermei, depauperati.*)

Pluteus lepiotoides Pearson in arena prope mare, Braunton Burrows, N. Devon. Oct. 1944. *Pileus* 5–6 cm. carnosus, convexo-planus vel umbonatus, squamulis concentricis obscuro-brunneis ornatus. *Lamellae* latissimae, ventricosae, liberae, roseae, acie undulata.

Stipes centralis v. excentricus 4–6 cm. longus, 4–5 mm. crassus, albus dein nubiloso-griseus, striato-fibrillosus, ad basim bulboso-radicans. *Caro* alba. Sporae roseo-tinctae, ellipticae laeves 6½–7 × 5–5½ μ. *Cystidia* aciei lamellarum lageniformia vel sacciformia. *Cutis pilei* (squamulae) ex hyphis 5–10 μ diam. obscure brunneis septis numerosis compositae.

Pluteus splendidus n.sp. (Pl. 3, fig. 7)

Cap 2½–6 cm., fleshy, campanulate or gibbous then flat, chrome yellow in smooth centre, elsewhere velvety dark yellowish brown, covered on brown part with a delicate network of raised veins; margin opaque. *Gills* very crowded, broad, chrome yellow at first, then flesh pink, thin, linear or ventricose, adnexed then free. *Stem* 2½–6 cm. long, 2–10 mm. thick, chrome or lemon yellow, paler at apex, equal or attenuated towards base, striate innately fibrillose. *Flesh* white in cap, pale lemon yellow in stem which is coarsely fibrous. *Taste* mild. *Smell* none. *Spore powder* Pinkish Cinnamon (Ridgway). *Spores* spherical or subglobose, apiculate 6–7 μ. *Cystidia* on gill edge fairly abundant, broadly clavate or ventricose, 10–25 μ wide, with broad obtuse apex. *Cap surface* hymeniform with pyriform cells 12–30 μ wide. Scattered highly refractive worm-like hyphae, 6–7 μ diameter, visible in the gill trama.

Habitat: on ground in mixed wood, Masham, Yorkshire, 27 September 1948; on grassy edge of beech wood, Mickleham, Surrey, 23 October 1948. (Section: *Mycacei.*)

This species differs from the rather dull yellow slender agaric which is generally accepted as *Pluteus chrysophaeus*, by the vivid colours of cap and stem. The two colours on the cap are clearly defined, the veined network appearing on the brown part only. It seemed to agree fairly closely with the description of *P. chrysophaeus* as given by G. Metrod in *Rev. mycol.* **8**, 69, 1943, but he thinks it distinct. Having rejected *P. chrysophaeus* I hoped that this brightly coloured agaric might be identified with the common North American species *P. admirabilis* Peck, but Dr Alexander Smith informs me that it is not the same.

As often happens with rare species, I gathered *P. splendidus* in two widely separated places during the same autumn.

Pluteus splendidus Pearson sp.nov. In silvis mixtis ad terram, Masham, Yorkshire, Sept. 1948; Mickleham, Surrey, Oct. 1948. *Pileus* 2½–6 cm. latus, carnosus, gibbosus vel campanulatus dein planus, centro clare flavo-citrinus, laevis, alibi fulvo-brunneus dense et delicate venoso-subreticulatus, margine striato. *Lamellae* confertissimae, latae, primo flavo-citrinae dein carneae, lineares vel ventricosae adnexae dein liberae. *Stipes* 2½–6 cm. longus, 2–10 mm. crassus, flavo-citrinus sursum pallidus, aequalis vel ad basim attenuatus, striatus, innate fibrillosus. *Caro* pilei alba, stipitis citrina. *Sapor* mitis. *Odor* nullus. *Sporae* globosae vel subglobosae, apiculatae, 6–7 μ; in cumulo roseo-cinnamomeae. *Cystidia* in acie lamellarum late clavata apice obtuso, 10–25 μ lata. *Cutis pilei* hymeniformis, cellulis piriformibus 12–30 μ latis.

Entoloma erophilum Fr.

Cap 2–4 cm., convex then depressed, often with small papilla in centre, dark grey, radiately fibrillose with blackish brown fibrils often breaking into small squamules, very fragile. *Gills* distant, broad, adnate breaking free, white at first then cloudy and finally with reddish tinge, unequal, edge wavy. *Stem* 4–6 cm. long, 3–6 mm. wide, equal grey, striate fibrillose. *Flesh* horny grey with white fibrous pith in centre of stem.

Taste very rancid. *Smell* faint. *Spore powder* Pinkish Cinnamon (Ridgway). *Spores* more or less asymmetrical, broadly elliptical angular with prominent apiculus; angles obtuse or acute, 8–9 × 5½–7 μ. *Gill edge* fertile. No cystidia. *Cap cuticle* having hyphae or various thicknesses with cloudy contents and black cystidioid tips.

Habitat: in large ring on lawn, West Dean Park, Sussex, on chalk soil, 28 August 1950.

This spring member of the Rhodophyllus group appeared in August instead of May. Fries described it as growing in large fairy rings (*vastos circulos oreadeos*). The ring was only about 12 ft. diameter, but there were hundreds of specimens. Mr Romagnesi, who put me on the right track, suggested that the species might be either *E. Pyrenaicum* Quél. or *E. erophilum* Fr. Allowing for variation due to climate, habitat, etc., these two species may be the same. The oldest name has been adopted.

Entoloma aprile Britz.

Cap 2·7 cm. fleshy in centre, subhygrophanous, convex semi-orbicular or campanulate with obtuse umbo, brownish grey, paler when dry, smooth, fragile, splitting; margin opaque. *Gills* subdistant, rather broad, ventricose adnexed or adnate emarginate, grey at first with reddish tinge later, veined, edge wavy. *Stem* 4–8 cm. long, 4–8 mm. thick, equal, whitish with greyish silky striate fibrils, hollow. *Flesh* grey with white patches. *Taste* and *smell* of new meal. *Spores* subglobose asymmetrical, angular, apiculate, 8–12 × 7½–10 μ, including apiculus. No cystidia. *Cap surface* with thin-walled slender hyphae, and pale brown contents.

Habitat: on ground under deciduous trees in early spring, *legit* R. W. G. Dennis, Burton Constable, Yorkshire, 9 April 1949.

Several forms have been described by Romagnesi in *Bull. Soc. mycol. Fr.* **63**, and a forma *majus* (month of May) illustrated in *Bull. Soc. mycol. Fr.* **65** (pl. XCII) corresponds to the specimens found by Dr Dennis. This may be the same as *Rhodophyllus majalis* sensu Lange which, however, seems to be nearer to *Entoloma rhodopolium*.

Pholiota pumila Fr. var. **subferruginea** Möller & Lange in *Fl. Ag. Dan.* **3**, 59 (pl. 109 F), 1938.

Cap 1½–2 cm., subfleshy, hygrophanous, convex or campanulate with papillate umbo, dull brown when moist, drying to ochraceous, with opaque margin, fragile. *Gills* rather broad, ventricose adnate with decurrent tooth, rusty ochre. *Stem* 4–5 cm. long, 2–3 mm. thick, equal or slightly thicker below, ochraceous above ring, darker below and striate with white fibrils, fistulose. *Ring* near apex, small, membranous (indistinctly striate above). *Flesh* buff. *Spores* amygdaloid, 9–11 (12) × 5–6 μ, smooth often guttulate, with granular contents. *Cystidia* on gill edge, swollen below, mostly with long slender neck, subcapitate. *Cap surface* with closely agglutinated slender hyphae.

Habitat: on mossy ground beside salt marsh, North Bull Island, Dublin, Ireland, 31 October 1950, *legit* F. C. Hassell.

(Section: *Galerina*.)

Hebeloma pusillum Lange, *Fl. Ag. Dan.* **3**, 95 (pl. 120 C), 1938.

Cap 1–2 cm., subviscid, campanulate then flat with obtuse prominent umbo, date brown paler towards margin, smooth, naked. *Gills* subdistant, ventricose, rather broad, whitish then pinkish clay-brown, edge weeping with beaded drops. *Stem* 2–4 cm. long, 1–2½ mm. thick, equal, often flexuose, white, pulverulent, solid. *Taste* slightly bitter. *Smell* faint of radish. *Spores* lemon-shaped, 10–14 × 5½–7 μ, smooth. *Cystidia* on gill edge clavate, 45–60 × 6–7 μ. *Cap surface* with sausage-shaped cells 4–12 μ wide.

Habitat: in swampy woods; Nuneham Park during the Oxford Foray, *legit* Morten Lange, 13 September 1949.

This small *Hebeloma* has hitherto been confused with the 'minor' form of *H. crustuliniforme* to which it is closely related. Its slender aspect suggests a *Naucoria* rather than a *Hebeloma*.

(Section: *Denudata*.)

Naucoria Jennyae Karsten in *Hedwigia*, **20**, 178, 1881, as *N. Jennyi* subsequently changed to *N. Jennyae* in *Haffswamper*, p. 232, 1882 = *Phaeocollybia Jennyae* (Karst.) Moser in *Sydowia*, **4**, 119, 1950.

Cap 1–3 cm., conical or campanulate with obtuse umbo, dark chestnut or bay brown, smooth, shining, margin incurved. *Gills* crowded, ventricose 1–2 mm. broad, adnexed then free, pale buff then rusty brown. *Stem* 6–10 cm. long, 2–3 mm. thick, equal in part above ground, tapering below to a point and deeply rooting, bay brown, cartilaginous, naked, shining. *Flesh* dingy white or buff in cap, foxy brown in stem. *Taste* and *smell* not noticed (earthy *sec.* Moser). *Spores* rusty brown, ovoid with oblique inconspicuous apiculus, 5–6 × 3½–4 μ, 1-guttulate, smooth. *Cystidia* on gill edge and face clavate 4–6 μ wide. *Basidia* 4-spored. *Cap surface* with septate, short, broad, hyphae about 30–40 × 15–17 μ.

Habitat: on ground, Dodnash Woods, East Bergholt, Suffolk, 27 October 1950, *legit* A. F. Parker-Rhodes; also at Rowney Warren, Shefford, Bedfordshire, 15 October 1950, *legit* R. W. G. Dennis.

It is surprising that this small but characteristic agaric should hitherto have escaped notice in Britain. There is a good illustration of *Naucoria Jennyae* in Lange's *Fl. Ag. Dan.* **4** (pl. 123, fig. A.)

(Section: *Phaeocollybia* Heim.)

Tubaria embola Fr.

Cap ½–1½ cm., subfleshy convex then flat sometimes with central papilla, hygrophanous, reddish brown or tawny yellow drying to pale buff, dry, smooth, mat; margin regular or crenulate, smooth or, in larger specimens, striate-sulcate. *Gills* distant, triangular, decurrent, broad and thick, unequal, brown, edge pallid. *Stem* 1–2 cm. long, 1–4 mm. near apex, more or less equal in small specimens but in larger ones thicker above, tapering downwards to a point, reddish brown, smooth. *Flesh* brown. *Taste* mild. Inodorous. *Spores* yellow under microscope, elliptical with very inconspicuous apiculus, mostly about 8 × 5 μ with some larger ones about 10 × 7 μ, smooth. *Gill edge* with small cylindrical cystidia, sometimes swollen below. *Cap surface* with elongated hyphae of different thicknesses up to 25 μ diameter.

Habitat: on peaty soil but apparently more common on sandy soil near sea. North Bull Island, Dublin, 7 December 1948 and 24 October 1949, *legit* F. C. Hassell; also at Braunton Burrows, North Devon, 29 October 1950, *legit* F. R. Elliston Wright.

Previous records of *T. embola* were doubtful, and it is now reinstated in the British list.

Galera tibiicystis Atkinson = *Galerina tibiicystis* (Atk.) Kühner = *Galera sphagnorum* sensu Konr. & Maub.

Cap 1–3 cm., thin, hygrophanous, campanulate with obtuse umbo, honey colour or brownish ochre, striate, paler and opaque when dry, no veil visible. *Gills* subdistant, rather thick, pale then rusty ochre, linear, adnate. *Stem* up to 12 cm. long, 1½–2½ mm. thick, more or less equal, paler than cap and white at base, pruinose at first, hollow. *Flesh* mild. *Smell* none. *Spores* amygdaloid, 9–11 × 4½–6 μ, rough with shallow warts. *Basidia* 4-spored. *Cystidia* slender skittle-shaped with rather long narrow neck and round top. *Cap surface* with long hyphae.

Habitat: in sphagnum tussocks, common.

This has hitherto been confused with *G. sphagnorum* (Pers.) Fr. which has a pointed cap, smooth spores and more cylindrical subcapitate cystidia without the well-defined globose head.

(Section: *Galerina.*)

Crepidotus Wakefieldiae Pilát in *Monographie du Genre Crepidotus*, p. 65, 1948, under section (or subgenus) *Dochmiopus* Pat. Latin diagnosis in 'Revision of genus *Crepidotus*', *Trans. Brit. mycol. Soc.* **33**, 247, 1951.

Cap 2–4 mm., shell-shaped, sessile, whitish with a dingy brown tint, with thin flesh, margin very thin and slightly incurved, hairy at the sessile base and often attached to the substratum by long fibres of white mycelium. *Gills* distant, 12–16 only, more rarely 20, remote from base and barely ½ mm. wide, dingy clay brown, mostly of one length or in the larger specimens mixed with shorter ones. *Spores* clay brown, spherical 5–6 μ, with fairly large apiculus and therefore looking almost pyriform, distinctly and densely warted, non-guttulate or with a small oily guttule. Hyphae of cap surface subhyaline, densely interlaced in a parallel direction 3½–5½ μ thick.

Habitat: on rotting wood and the bark of deciduous trees collected at Cotterill Clough, Cheshire, by Miss B. Harthan, September 1944 and at Donhead, Wiltshire, by Captain A. Dunston, January 1946.

The above differs from *C. Cesatii* (Rab. 1851) Sacc. (= *C. sphaerosporus* (Pat. 1887) Lange) in the larger and more densely warted globose apiculate spores, clay coloured without a pinkish tint. The cap has a brownish tinge instead of being pure white.

Another British species in Dr Pilát's *Monographie* is *C. hibernicus* Pearson which he described from specimens in the Kew Herbarium and which had provisionally been labelled by me with this name. Subsequently, it was described in *Trans. Brit. mycol. Soc.* **32**, 268, 1949, as *C. hibernianus* Pearson & Dennis. Dr Pilát supplied no Latin diagnosis so the latter name is the valid one. In his study of the Kew exsiccata the following details were given which should be added to our description: spores in water yellowish brown, in potash deep rusty brown, the difference in colour being very striking. The basidia and some of the hyphae are coloured rusty red in potash.

I have to thank the author of this excellent monograph for introducing a new subgenus *Pearsonomyces* Pilát. At present the only known species in the subgenus (or section) is *C. hibernianus*, its chief diagnostic feature being the action of potash on the spores and hyphae.

Cortinarius (*Phlegmacium*) **sulphurinus** Quél. var. **Langei** Henry in *Bull. Soc. mycol. Fr.* **55**, 169, 1939 = *C. sulphurinus* sensu Lange in *Dansk Bot. Ark.* **8** (7), p. 17, and *Fl. Ag. Dan.* **3**, 18 (pl. 83 A.)

Cap 4–5 cm., convex then flat, viscid soon dry, peeling, tawny yellow with white or rusty spots in centre being adnate fragments of veil. *Gills* subcrowded, pale clay then brown, edge smooth or fimbriate. *Stem* 4–6 cm. long, 1–1½ mm. thick, white streaked with white or rusty fibrils from veil, equal to clearly cut marginate bulb. *Flesh* pallid yellow. *Taste* mild. *Smell* strong of mushroom. *Spores* amygdaloid subcitriform 10–12 × 5½–6 μ verrucose. *Chemical reaction:* KOH: cuticle of cap = chestnut brown.

Habitat: beech woods, Netley Park, Gomshall, Surrey, 18 November 1949, *legit* Peter Orton.

(Section: *Scauri.*)

This variety differs from the type in the tawny cap instead of the pale lemon cap of Quélet's species.

Cortinarius (*Phlegmacium*) **subturbinatus** R. Henry, *Bull Soc. mycol. Fr.* **55**, 167, 1939.

Cap 5–19 cm., subspherical then convex, ochraceous, paler at margin which is strongly incurved, viscid, mat. *Gills* crowded, unequal, whitish then cloudy-milk tinted, edge denticulate. *Stem* 5–10 cm. long, 1–2 cm. thick, white, ochraceous on bulb which is abruptly and very broadly marginate. *Flesh* white. *Taste* mild. *Smell* pleasant. *Spore powder* Amber Brown (Ridgway). *Spores* subcitriform, 10–12 × 5½–6½ μ (12–13½ × 7–8 μ *sec.* Henry), verrucose. *Gill edge* subfertile with basidioid cells. *Chemical reactions:* cuticle of cap + NaOH = dark brown, flesh + NaOH = no colour change.

(Section: *Scauri.*)

Habitat: in beech woods, Polesden Lacy, 2 September 1950, *legit* John Brooke.

Cortinarius (*Phlegmacium*) **citrinus** (Lange) Henry in *Bull. Soc. mycol. Fr.* **55**, 176, 1939 = *C. elegantior* Fr. forma *citrinus* Lange in *Dansk Bot. Arkiv.* **8** (7), 17, 1935 = *C. sulphureus* Kauffm. var. *citrinus* Lange in *Fl. Ag. Dan.* **3**, 18, 1938.

Cap 4–5 cm., olivaceous yellow or brownish with thin cuticle, peeling, vivid sulphur underneath, viscid, smooth, polished, margin incurved, opaque. *Gills* subcrowded, yellow at first, linear, adnate emarginate, edge rather wavy. *Stem* 7–8 cm. long, 7–8 mm. thick, equal to well-marked marginate bulb, sulphur yellow with striate rusty fibrils in lower part.

Flesh bright sulphur. *Taste* mild. *Smell* pleasant, rather fragrant. *Spore powder* Amber Brown (Ridgway). *Spores* amygdaloid subcitriform, 9–11 × 5½–6 μ, minutely verrucose. *Gill edge* fertile. *Basidia* 4-spored. *Chemical reaction* KOH = olive green in all parts.

Habitat: beech woods Gomshall, Surrey, 1 October 1950, found by John Brooke and Peter Orton.

(Section: *Scauri.*)

Cortinarius (*Phlegmacium*) **sodagnites** Henry in *Bull. Soc. mycol. Fr.* **51**, 44, 1935.

Cap 4–10 cm., thin or thick, convex soon flat, finally depressed like a saucer, very viscid, cuticle bitter, peeling, pruinose when drying, at first violaceous lilac or amethyst, quickly discolouring in parts and finally creamy or ochraceous buff all over; margin incurved, overlapping gills. *Gills* crowded, thin, fragile, narrow (4–5 mm.) linear, adnexed, lilac slowly changing as spores mature, edge denticulate often retaining violaceous tint. *Stem* 4–10 cm. long, 5–12 mm. thick, thicker above or equal to clear-cut widely marginate bulb, firm, solid, violaceous with striate fibrils, then dingy white with brownish fibrils, the violaceous tint often persisting at apex. *Flesh* whitish or pale buff turning rusty brown at base. *Taste* mild except cuticle of cap which is bitter. *Smell* faint. *Spore powder* Argus Brown (Ridgway). *Spores* amygdaloid, punctate, 8–12 × 5–6 μ. *Gill edge* sterile, packed with clavate cells 6–8 μ wide (*sec.* Henry 9–20 μ wide). *Chemical reaction* KOH and NaOH, *on cuticle only*, brilliant crimson red (red ink). This reaction does not take place on the flesh or the stem, and is a valuable spot point for this species—hence the name *sodagnites* = *sodio-agnitus*, known by soda.

Habitat: in beech woods, Gomshall, Surrey, 18 November 1949 and 6 October 1950, *legit* P. Orton.

(Section: *Scauri.*)

C. sodagnites is usually slender but some of our specimens were larger, more robust and with thicker flesh than usual.

Cortinarius (*Dermocybe*) **malicorius** Fr.

Cap 1–4 cm., campanulate with obtuse umbo, dark olive green turning dark brown or black, margin when fresh bright olive yellow; silky with radial innate fibrils. *Gills* subdistant, ventricose or wedge-shaped, adnate breaking free, emarginate, olive brown with yellow fimbriate edge. *Stem* 3–6 cm. long, 3–5 mm. thick, equal to round bulbous base, olive brown, striate fibrillose, hollow. *Flesh* olive green. *Taste* mild. Inodorous. *Spore powder* Amber Brown (Ridgway). *Spores* elliptic, 6 × 4 μ, minutely punctate. *Gill edge* fertile.

Habitat: among beech leaves, Gomshall, Surrey, September and October 1949 and 1950, *legit* P. Orton.

This uncommon species is already in the British List. It is quite distinct, however, from the *C. malicorius* of Konrad & Maublanc, *Ic. Sel. Fung.* (pl. 147), which must be another species. The *C. malicorius* of Lange (pl. 95 D) is probably correct, but the yellow margin of the cap was much more vivid in our specimens and so was the olive-green flesh.

Cortinarius (*Telamonia*) **biformis** Fr.

Cap 2–5 cm., conical or campanulate, umbo usually acute, depressed round umbo, often scalariform, bay brown at first then tawny brown, umbo darker, hoary when young, covered with adpressed whitish or tawny fibrils which later persist round margin. *Gills* subdistant, broadly linear, adnate emarginate, edge more or less wavy, brown. *Stem* 2–6 cm. long, 2–10 mm. thick, equal or pointed at base, colour of cap, at first sheathed to middle; ring membranous, white when fresh, lower part shaggy or smooth; striate fibrillose above ring. *Flesh* brown, drying to buff. *Taste* somewhat rancid. *Smell* faint, nothing distinct. *Spore powder* Sudan Brown (Ridgway). *Spores* subfusoid rather like a *Boletus* spore, flattened on one side, 10–13 × 4–5 μ, minutely punctate. *Gill edge* fertile; no cystidia.

Habitat: in troops under pines, solitary or caespitose, common late in autumn. Witley Common, Surrey, October and November 1940 to 1950. Hollesey Heath, Suffolk, 24 October 1950.

This very variable species is not the *biformis* of Ricken or Lange but seems to conform more closely to the Friesian description. It is easily recognized by the subfusoid spore. This is shown in the otherwise very poor figure in Cooke's *Illustration*, p. 815 (869). It is probably identical with *Cortinarius heterosporus* Bres., *Icon. Myc.* Tab. 641.

Cortinarius (*Hydrocybe*) **Adalbertii** J. Favre in *Associations fongiques des hauts-marais jurassiens*, p. 104, 1948. *Hydrocybe pateriformis* Fr. *sensu* Ricken. (Pl. 3, fig. 3.)

Cap up to 5 cm., fleshy, hygrophanous, conical, with papillate acute umbo when expanded, bay chocolate brown with blackish umbo when fresh, drying to dark chestnut paler at margin, smooth in centre, hoary from whitish veil when young, only round margin later, margin incurved and often undulate. *Gills* subcrowded, up to 7 mm. broad, veined, adnate emarginate, ochraceous saffron, edge white, fimbriate. *Stem* up to 5½ cm. long, 9 mm. thick above, 6 mm. below, equal or tapering downwards solid, paler than cap and marked with several white zones from the cortina which however does not form a definite ring. *Flesh* reddish chocolate. *Taste* mild. *Smell* none. *Spores* under microscope brown, translucent, elliptical with oblique apiculus 6–7 × 3 μ (6–7½ × 3½–4 μ, J. Favre) 1-guttulate, minutely verrucose. *Gill edge* fertile. *Basidia* 4-spored. *Cap surface* with brown hyphae 3–7 μ diameter.

Habitat: amongst heather on moor; pines in vicinity, below Loch Morlech, Rothiemurchus, Scotland, 20 September 1950, *legit* R. W. G. Dennis.

Dr Jules Favre kindly confirmed the determination. The main features of *C. Adalbertii* are the dark chocolate colour of the cap, the strongly contrasting saffron gills and the small spores. Dr Favre found it in the uplands of the Swiss Jura under spruce in peaty soil among *Vaccinium* and moss.

Cortinarius (*Hydrocybe*) **acutus** (Pers.) Fr. *sensu* Favre. (Pl. 2, fig. 6.)

Cap 1½–2½ cm., fleshy in centre, conical campanulate with finger-like papilla 5–6 mm. long, drawn out to a point or with blunt apex, radially fibrillose, pale chamois buff, when moist striate by transparence, opaque when dry, margin usually crenulate. *Gills* subdistant up to 4 mm. broad, ventricose, adnate emarginate, clay colour then dark clay, edge white, eroded. *Stem* 4–6 cm. long, 2–2½ mm. thick, equal, rather elastic, hollow, striate with white fibrils, pale buff underneath. *Flesh* pale buff. *Taste* mild or slightly bitter after mastication. *Smell* of iodoform when drying. *Spores* pale ochre, translucent under microscope, elliptical with barely visible oblique apiculus, minutely punctate, 7½–9 × 5–5½ μ. *Gill edge* sterile with long cylindrical cells 6–7 μ wide, mixed with some fat ventricose cells up to 25 μ wide.

Habitat: in mixed woods, Spreacombe, North Devon, *legit* F. R. Elliston Wright, 2 October 1948.

There are so many different interpretations of *C. acutus* that it would be convenient to abandon the name. If it is to be retained we cannot do better than adopt it in the sense of Jules Favre as described by him in *Bull. Soc. mycol. Fr.* **55**, 201, 1938. Other mycologists have already done this. Morten Lange in *Friesia*, **4**, 207, 1946, accepts it and agrees that his father's plate 104 B in *Fl. Ag. Dan.* represents a form of *C. fasciatus* frequently met with in our pine woods. Cook's pl. 852 (845) may be the same species but is much more likely to be *C. ammophilus* Pears. (*Trans. Brit. mycol. Soc.* **29**, 198) since the flesh is reddish.

Cortinarius (*Hydrocybe*) **depressus** Fr.

Cap campanulate, 2–6 cm. with prominent obtuse umbo, depressed round umbo, reddish brown, umbo dark, almost black, streaky with radial buff lines when drying, smooth, not peeling, margin strongly incurved when young, regular or wavy, opaque; veil whitish buff on margin and white on extreme edge. *Gills* subdistant, ventricose, broad, unequal adnate emarginate, pale brown then dark reddish brown. *Stem* 5–6 cm. long, 4–8 mm. thick, swollen below, buff with white striate fibrils, a few fragments of veil present, cartilaginous, solid. *Flesh* watery buff, reddish horny under cap cuticle and above gills. *Taste* mild. Inodorous. *Spore powder* Argus Brown (Ridgway). *Spores* subamygdaloid, 7½–8½ × 5 μ, minutely punctate. *Gill edge* fertile. *Basidia* 4-spored with long sterigmata 4–5 μ long. Chemical reaction: KOH = Dark Brown.

Habitat: in mixed wood, Chawley Woods, Hampshire, 3 October 1950.

Cortinarius (*Hydrocybe*) **Hoeftii** (Weinm.) Fr. sensu Lange in *Fl. Ag. Dan.* **3**, 48 (pl. 103 A), 1938.

Cap 1–4 cm., campanulate, with obtuse umbo, clay colour covered with a white pruina which gives the surface a 'lurid' aspect, smoky black on umbo, radially innately fibrillose. *Gills* distant broad, ventricose, adnate emarginate, pale clay at first, unequal, edge whitish smooth. *Stem* 3–7 cm. long, 2–4 mm. thick, equal white with striate fibrils, solid with separable pith then hollow. *Flesh* buff drying to white. *Taste* mild rather nasty. *Smell* strong of iodoform. *Spores* broadly ovoid or subglobose, 6–7 × 5–5½ μ, often 1-guttulate, slightly punctate. *Gill edge* subfertile with numerous sterile basidioid cells. *Basidia* 4-spored. *Cap surface* with fat sausage- or balloon-shaped cells up to 40 μ wide.

Habitat: Verdley wood, Henley, Sussex, 27 October 1945; and Braunton, North Devon, 3 December 1949, mixed woods.

Inocybe pudica Kühner in *Ann. Scient. Franche Comté*, **2**, 12, 1947 = *I. rubescens* Gill. *sensu* Lange.

Cap 1½–4 cm., campanulate, subviscid, white turning pink in patches or pale brown on umbo, smooth, innately fibrillose, margin at first incurved, opaque, cuticle peels, white veil visible when young. *Gills* subcrowded, ventricose, up to 6 mm. broad in large specimens, thin, soft, adnexed then free, white at first with red patches then cloudy and finally snuff brown. *Stem* 4–10 cm. long, 5–7 mm. thick, equal, base slightly swollen sometimes marginate, firm, solid then hollow. *Flesh* white slightly blushing or a more vivid red in pith of stem. *Taste* mild then rancid. *Smell* of new meal. *Spore powder* snuff brown. *Spores* dark brown, subtranslucent under microscope, elliptical almost bean-shaped, with short apiculus, smooth, 8–9 × 5 μ. *Cystidia* ventricose with short or long neck, apex cristate 40–60 × 14–20 μ with thick hyaline walls mixed with thin-walled pyriform paracystidia.

Habitat: under conifers; Bettws-y-Coed, Wales, under spruce, in troops, 12 September 1950.

This uncommon species has been confused with the more common *Inocybe Godeyi* Gillet (= *I. Rickenii* Kallenbach) which turns a deeper red, has amygdaloid spores and a definitely marginate bulb.

Dr R. W. G. Dennis has suggested (*in litt.*) that *I. pudica* may be the var. *lateritia* of *I. geophylla*, an interesting speculation which we are not in a position to verify. The two species are closely related.

Inocybe (*Astrosporina*) **xanthomelas** Boursier & Kühner in *Bull. Soc. mycol. Fr.* **49**, 84, 1933.

Cap up to 5 cm. but usually small 2–3 cm. campanulate with obtuse or acute umbo, then flat or upturned, umbo sometimes flattening, straw yellow then pale ochraceous brown, cuticle soon breaking up and peeling concentrically in a shaggy way showing creamy yellow flesh, centre with thin white pruine. *Gills* subdistant, ventricose, narrow or broad, adnexed or free, white at first then dark clay colour, edge white minutely eroded, mostly one length with an occasional short one. *Stem* 3–5 cm. long, 2–3 (4) mm. thick, often remarkably slender, equal with clear-cut marginate bulb white or slightly buff tinted, white on bulb, firm, solid, very minutely striate, fibrillose with a few loose fibrils, pruinose when fresh; turns black when dried. *Flesh* white. *Taste* mild. *Smell* faint. *Spore powder* Snuff Brown (Ridgway). *Spores* oblong with prominent nodules 6 to 7 in outline, 10–12 × 6–7 μ. *Cystidia* on gill edge ventricose with thick yellow walls, 40–60 × 15–18 μ, neck usually short.

Habitat: in mixed woods, West Dean Park, Sussex, in troops, July and August 1950. Also gathered at Spreacombe, North Devon, August 1948, by F. R. Elliston Wright.

Inocybe (*Astrosporina*) **grammata** Quél.

Cap 1½–4 (6) cm., subfleshy, campanulate, smooth, at first whitish or pale clay with pink tinge, white on umbo, covered with radial white delicate fibrils specially evident near whitish margin; later turning to dark straw yellow more or less radially furrowed and with arachnoid fibrils, umbo remaining smooth. *Gills* crowded, rather narrow, ventricose, unequal, adnexed then free, white at first then cloudy and finally snuff brown, edge slightly eroded. *Stem* 4–5 cm. long, 3–6 mm. thick, equal or attenuated above white or with flesh pink tint, minutely striate, base with white marginate bulb. *Flesh* white on disk, pale flesh colour elsewhere. *Taste* mild, rancid. *Smell* none or of fresh meal (sometimes nauseous *sec.* Kühner). *Spore powder* snuff brown. *Spores* nodulose, outline with 4 to 5 blunt nodules, 7–8 × 5–5½ μ. *Cystidia* abundant on gill edge, sparse on face, thick-walled, cylindrical or ventricose, mostly without neck, cristate at apex, walls yellow tinted, 50–70 × 17–20 μ.

Habitat: in grass at the edge of mixed woods, Hindhead, Surrey, 21 October 1948; West Dean Park, Sussex, 14 July 1950; also from larch wood, Knowle, North Devon.

Psathyrella impatiens (Fr.) Gillet

Cap up to 7 cm., convex then conical with obtuse umbo, when young reddish brown soon turning to pale buff, darker on umbo with deep greyish black sulcate striae, then splitting and upturned. *Gills* distant, narrow, linear, adnate, pallid grey then blackish, edge white more or less eroded, thin, very fragile. *Stem* up to 10 cm. long, slender (3–4 mm.) white striate, innately fibrillose, polished, hollow. *Flesh* buff in cap, white in stem. *Taste* mild. *Smell* pleasant. *Spore* powder black. *Spores* under microscope in water dark brown, in KOH brown, elliptic with clearly visible germ pore, 9–10 × 4½–5½ μ, smooth. *Cystidia* on gill edge flask-shaped with long tapering neck, apex blunt or acute, 40–50 × 10–12 μ. *Cap surface* with globose cells and scattered lanceolate cystidia.

(Section: *Pseudocoprinus*.)

P. impatiens appears to be fairly common in beech woods. We have confused it with *P. crenata* which is much smaller and has a hairy stem.

Psathyrella fatua (Fr.) n.comb. = *Psathyra fatua* Fr.

Cap 2–4 cm., hygrophanous, broadly conical or campanulate, umbo usually obtuse, ochraceous with rusty umbo, drying to pale clay, at first with adpressed evanescent fibrils, radially rugulose; margin regular or undulate, sometimes appendiculate with white veil. *Gills* crowded, pallid greyish then dark brown, linear or slightly ventricose, adnate. *Stem* 4–6 cm. long, 2–5 mm. thick, terete or compressed, white with striate fibrils, greyish when old, hollow. *Flesh* buff in cap, white or greyish in stem. *Taste and smell* not noticed. *Spores* in mass dark date brown; under microscope in water: dark brown, opaque; in KOH: greyish with slight violaceous tint, 8–9 (10) × 4–5 (5½) μ, smooth, with germ pore. *Cystidia* on gill edge pyriform or broadly flask-shaped wide, with short neck. *Cap surface* with globose or pyriform cells mostly 20–30 μ wide.

Habitat: usually caespitose; on ground or attached to wood debris, Ruislip, Middlesex, 16 October 1948, *legit* R. W. G. Dennis. Uncommon. (Section: *Eu-Psathyra.*)

Psathyrella fusca (Schum. ex Lange) n.comb. = *Psathyra fusca* (Schum.) Lange, *Dansk. Bot. Arkiv.* **9**, (1) 12, 1936 and *Fl. Ag. Dan.* **4**, 97 (pl. 154 C), 1939.

Cap 3–6 cm., fleshy, hygrophanous, gibbous, reddish brown drying to biscuit buff, not peeling, smooth in centre, often radially corrugate towards margin, smooth, naked, mat; margin not incurved, opaque, white veil adhering to margin. *Gills* subdistant, ventricose, broad, unequal, adnate breaking free, thin, white then greyish brown, later dark blackish brown, edge white fimbriate. *Stem* 6–8 cm. equal or swollen below, soft, hollow, fragile, white woolly at first, then striate grooved, silky, with a few loose fibrils below. *Flesh* white. *Taste* mild. *Smell* pleasant. *Spore powder* black. *Spores* under microscope dark brown, opaque; in KOH violaceous grey, elliptical with germ pore, $8–11 \times 5–5\frac{1}{2}\,\mu$, smooth, a few larger ones about $15 \times 6\,\mu$. *Cystidia* on gill edge very variable, flask- or sack-shaped, apex obtuse, a few seen with bifid apex, $40–60 \times 12–16\,\mu$. Cap surface with round or ovoid cells.

Habitat: Fairly common in beech woods, Surrey and Sussex.

(Section: *Eu-Psathyra.*)

In *Hym. Eur.* p. 306 Fries listed *Agaricus* (*Psathyra*) *fuscus* Schum. as var. *major* of *A. obtusatus*.

If Lange's interpretation of the latter is accepted, the two species must be considered as distinct. However, this group requires a complete overhauling before anything like a satisfactory systematic arrangement is established.

Psathyrella pygmea (Bull. ex Fr.) n.comb. = *Drosophila pygmea* (Bull. ex Fr.) Quél. = *Psathyra consimilis* Bres.

Cap 6–10 mm., membranaceous, convex, whitish when young then dingy white or brown, rimose; margin with dark striae by transparence. *Gills* very crowded, ventricose, $1\frac{1}{2}$ mm. broad, unequal, adnate, pallid then dark brown, edge white. *Stem* $1–1\frac{1}{2}$ cm., equal with small basal bulb, rather elastic, hyaline white, naked, hairy near base. Veil not visible. *Flesh* white. *Taste* mild. *Smell* pleasant fungoid. *Spore powder* brownish black. *Spores* elliptical, $5\frac{1}{2}–7 \times 3\frac{1}{2}–4\,\mu$, smooth, with germ pore, under microscope in water dark brown opaque; in KOH pallid brown, translucent. *Cystidia* on gill edge broadly ventricose, sublageniform with short neck and obtuse apex, some pyriform, about $20–25 \times 10–12\,\mu$. *Cap surface* hymeniform with globose, ovate or allantoid cells $25–40\,\mu$ wide.

Habitat: on ground near tree in dense group, Norbury Park, Mickleham, Surrey, 20 October 1950.

(Section: *Eu-Psathyra.*)

P. pygmea may not be so rare as we have thought. It could easily be passed over as *P. disseminata* which, however, is quite distinct.

Psalliota bitorquis Quél. *Ass. Fr. Sc.* 1883, pp. 3–4, pl. VI, fig. 8. = *P. Rodmanii* Peck (1884) = *Agaricus campestris* Fr. var. *edulis* Vitt. (1835). (Pl. 2, fig. 3.)

Cap 2–9 cm., thick fleshy, convex with flat or slightly depressed centre, silky white when young, subsequent changes variable, mostly pale buff when old with straw yellow patches but sometimes reddish, often rugose-areolate in centre, smooth towards margin; when very young not peeling but later the thick cuticle peels easily; margin incurved with widely overlapping thickened cuticle. *Gills* very crowded, narrow, linear, free, unequal, thin, pinkish before opening then Cinnamon Drab (Ridgway), finally brownish black, edge whitish, smooth or slightly eroded. *Stem* 4–6 cm. long, 1–3 cm. thick, equal, obconic or subclavate, firm, solid, or with small hollow region in centre, white above rings or cloudy with spores, turns pinkish, minutely floccose-squamulose; when young mycelial strands sometimes hang from base. *Ring* in duplicate, each distinct, one peronate (volvate) closely adnate to base, the other loosely fitting into the lower one like a funnel. The lower one is usually covered with soil. *Flesh* white turning pinkish or pale rusty brown. *Taste* rather strong. *Smell* strong and pleasant. *Chemical reactions*: $FeSO_4$ = dark green; KOH = no colour change. *Spore powder* blackish brown (Fuscous of Ridgway). *Spores* mostly about $6 \times 5\,\mu$ with a few larger, smooth, 1-guttulate, in water under microscope brown, translucent; in KOH grey, translucent with black outline. *Basidia* 4- or 2-spored, about $25 \times 7\,\mu$. *Cystidia* on gill edge cylindrical or clavate, mostly 6–8 μ wide, a few wider and about 25–30 μ long. *Cap surface* with hyphae 8–10 μ diameter.

Habitat: on roadsides; *legit* R. W. G. Dennis, 30 May 1950, Richmond, Surrey, near edge of asphalt path, pushing through the asphalt; also from Braunton, North Devon, 1949 (fide Miss Wakefield).

(Section: *Rufescentes.*)

The development of this mushroom usually takes place underground, and when gathered it would hardly be recognized from the above description as the double ring will have lost its distinctive character, portions only adhering to the stem. Our specimens were gathered before bursting through the hard asphalt and then allowed to mature indoors. The subsequent development corresponds to the descriptions of various authors, though in these there occur some discrepancies owing to the variable changes that take place as described above.

Psalliota Langei F. H. Möller in *Friesia*, **4**, 28–30, 1950 = *P. haemorrhoidaria* sensu Lange in *Fl. Ag. Dan.* **4**, 56 (pl. 137 C) 1939.

Cap 6–12 cm., with thick flesh, ovoid or semiglobose with flattish apex, umber brown with blackish brown adpressed rather large scales, smaller and more fibrillose near margin, dense and smooth in centre; margin inturned; cuticle peels easily. *Gills* crowded, unequal, pink at first then pinkish drab, finally dark brown, linear, free, edge whitish slightly eroded. *Stem* 6–12 cm. long, 1½–2½ cm. thick, cylindric or slightly ventricose without bulb at base, whitish then brown with pink flush, reddish when handled, striate fibrillose. *Ring* superior sheathing from above, white and smooth on upper side, with brown scales underneath. *Flesh* white turning blood red or pink. *Taste* mild. *Smell* strong of mushroom. *Spore powder* Clove Brown (Ridgway). *Spores* elliptical, $7–8 \times 4\frac{1}{2}–5\,\mu$, smooth, with oblique apiculus. *Basidia* 4-spored. *Gill edge* sterile with pyriform cells $10–30\,\mu$ wide.

Habitat: in fir woods Haslemere, Surrey, October 1949.

(Section: *Sanguinolentes.*)

This species is not often met with, and is chiefly distinguished from the more common *P. haemorrhoidaria* Kalchbr. by the larger spores. The bleeding mushrooms are puzzling. I have collected several which do not square with the published descriptions. These usually appear solitarily and at rare intervals so it is impossible to say if they are typical representatives of a stable species. Mr F. H. Möller has recently published in *Friesia*, **4**, the first part of his study of the genus *Psalliota* which will prove very helpful.

Psalliota Bernardii Quél. was inadvertently omitted from the 'Revised List' and should be reinstated. The main features of this remarkable and very variable mushroom which grows to an enormous size, are the coarsely areolate cap often breaking up into adpressed, erect or pyramidal scales, the obconic peronate stem and reddening flesh. It was found on 22 October 1950, during a fungus foray at Flatford Mill, Suffolk, growing in meadows subject to flooding by brackish water which is its usual habitat.

Boletus pruinatus Fr. sensu Rea.

Cap 9–10 cm., fleshy, convex then plane or depressed, purplish bay brown covered with a hoary bloom. *Tubes* and *Pores* lemon yellow, small, often angular. *Stem* 9–11 cm. long, $2–2\frac{1}{2}$ cm. thick, equal or ventricose, yellow at apex, reddish elsewhere, bluish when handled. *Flesh* chrome yellow often tardily turns greenish blue at base. *Taste* mild. *Smell* faint, pleasant. *Spore powder:* Medal Bronze (Ridgway). *Spores* subfusoid with oblique apiculus about $15 \times 7\,\mu$. *Cap surface* with hymeniform sack-shaped cells $12–15\,\mu$ wide.

Habitat: in troops under beech. Henley Hill, Sussex, 24 October 1949.

(Section: *Xerocomus.*)

This very striking *Boletus* differs from the description of Fries in having chrome yellow flesh. It is certainly distinct from either *chrysenteron* or *versicolor*. It is open to question whether it is the *pruinatus* of Fries.

EXPLANATION OF PLATES 2 AND 3

Spores: × 1000. Cystidia: × 500.

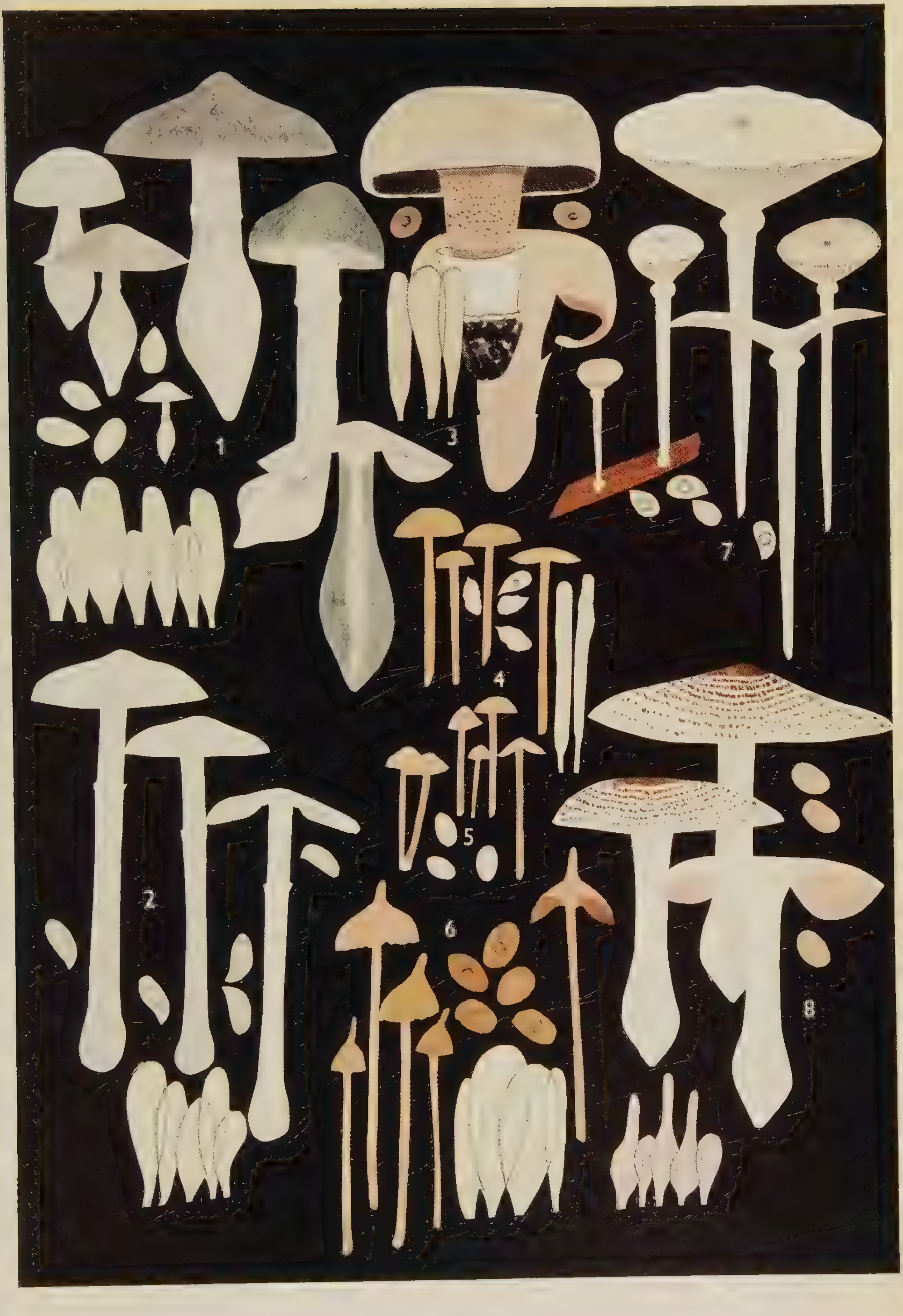
Plate 2

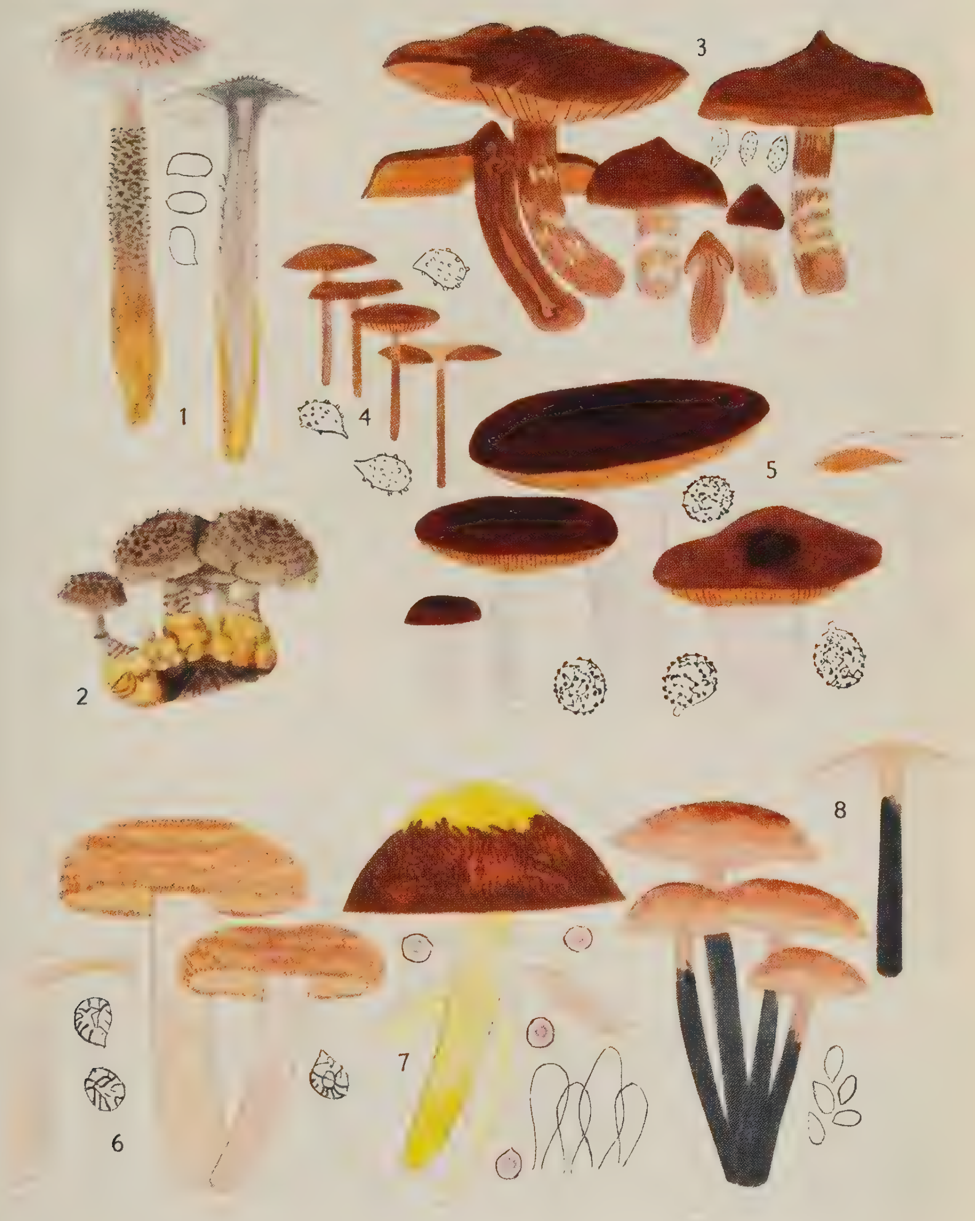
Fig. 1. *Lepiota pinguipes.* × 2/3.
Fig. 2. *L. serena.* × 1.
Fig. 3. *Psalliota bitorquis.* × 2/3.
Fig. 4. *Collybia griseospora.* × 1.
Fig. 5. *C. paupertina.* × 1.
Fig. 6. *Cortinarius acutus.* × 1.
Fig. 7. *Omphalia roseotincta.* × 1.
Fig. 8. *Pluteus lepiotoides.* × 2/3.

Plate 3

Figs. 1 and 2. *Tricholoma odoratum.* × 1.
Fig. 3. *Cortinarius Adalbertii.* × 1.
Fig. 4. *Collybia ferruginella.* × 1.
Fig. 5. *Russula cessans.* × 2/3.
Fig. 6. *Lactarius Mairei* var. *zonatus.* × 2/3.
Fig. 7. *Pluteus splendidus.* × 1.
Fig. 8. *Marasmius Cauvetii.* × 1.

(*Accepted for publication* 16 *July* 1951)


1
2
3
4
5
6
7
8


3
1
4
5
2
8
7
6

DISPERSAL OF FUNGUS SPORES BY SMALL ANIMALS INHABITING WOOD AND BARK

By P. H. B. TALBOT

Division of Botany and Plant Pathology, Pretoria

A preliminary study of the dispersal of some common lignicolous saprophytic fungi by the agencies of small animals and water-splash indicates that these are valuable alternatives to wind dispersal where the nature of the habitat precludes efficient transport of the spores by air currents. Various kinds of small animals habitually ingest fungi, and also transport the spores mechanically outside their bodies. The spores of several fungi have been proved viable after passage through the digestive tracts of these animals. The problem is approached ecologically, with particular reference to the dispersal of spores of resupinate Hymenomycetes.

Field observations of the characteristic habitats of some resupinate Hymenomycetes led me to doubt the efficiency of wind as an agent in the dispersal of their spores.

Buller's (1909, 1922) classical experiments on spore dispersal in the higher Basidiomycetes point to three main requirements:

(1) A sequence of tropic responses in the growing fungus, which interact to bring the hymenium into a downward-facing position no matter what may have been the position of the sporophore at the beginning of development.

(2) Forcible discharge of the spores to a more or less constant distance from the sterigmata.

(3) Freedom for the discharged, falling spore to be carried away by wind before it can touch any obstruction to which, by virtue of its sticky exospore, it would adhere firmly.

The relatively few experiments Buller made on lower, resupinate Hymenomycetes established that their spores are indeed forcibly discharged (Buller, 1909, p. 21; 1922, pp. 170–1); but he assumed that the hymenia usually face downwards and are high enough above the ground to permit free falling of the spore (Buller, 1909, p. 217).

Although the spores of resupinate Hymenomycetes are potentially capable of wind distribution, anemochory is unlikely to be the main dispersal process, for resupinates commonly grow under logs or humus, closely pressed to the soil and often surrounded by densely imbricated fallen leaves. In such places the spores are not likely to be carried off by wind, or by air currents even if generated by temperature changes as suggested by Falck (Buller, 1909, pp. 218–19). Conversely, spores are not readily carried under logs by wind. How then does the fungus arrive under a log?

I have satisfied myself many times by field observation that resupinates are unable to undergo tropic movements to bring the hymenium into a downward-facing position if it does not face downwards naturally.

These fungi are frequently found growing on the upper or lateral surfaces of the substratum, and being resupinate are unable to reflex themselves, with the consequence that the projected spores fall back very readily on the hymenium. This process appears to be quite normal in most species of *Coniophora* and *Merulius*, and in *Corticium albostramineum*, where it is found that the spores remain on the hymenium and eventually become overgrown by tissues. Spores embedded in this way appear to retain their protoplasm and may well be viable. In *Coniophora* it is usual for the mature basidia to project almost their full length above the rest of the hymenium at the time of spore discharge, thus greatly increasing the chances of the spores being wafted away by wind—yet apparently the spores fall back on the hymenium again.

The evidence is thus against wind as the sole, or even the main, dispersal agent of the spores of resupinate Hymenomycetes. In considering alternative agents, it became very obvious that insects and other small animals which inhabit wood and bark should not be overlooked. Though scant reference has ever been made to the importance of small animals in distributing the spores of common saprophytic lignicolous fungi, an impressive amount of literature has appeared concerning other aspects of the relationships of insects and fungi, for details of which references given by Leach (1940) and Wolf and Wolf (1947, II, chaps. 8 and 20) should be consulted. In addition, several fungus diseases of plants, transmitted by insects, are discussed by Spaulding (1903).

The activity of small animals in dispersing the spores of saprophytic fungi is specifically mentioned by a few authors. Thus Buller (1909) observes that springtails (Collembola) have been found with spores in their alimentary tracts; but after reviewing the role of slugs and toads in assisting the germination of the spores of certain Agarics by the action of digestive ferments, Buller (1909, pp. 224–30) suggests that the majority of the Hymenomycetes are anemochorous, and that only secondary use is made of animal dispersal by some species of fungi for which small herbivorous animals provide the right conditions for spore germination. Johnson (1920) writes, '*Panus stypticus* is one of the many fungi eaten by slugs', and, 'it is possible that slugs may be active agents in the dispersal or even the germination of the spores'. Gordon (1938) gave an account of the presence of spores of *Lycoperdon pyriforme*, *Ustilago avenae* and *Tilletia tritici* in the gut and faeces of *Cartodere filum*, a type of beetle infesting herbarium specimens. He was also able to demonstrate germination of the spores of *Ustilago avenae* after they had been excreted by the beetle. Wolf and Wolf (1947, p. 175) draw attention to the constant presence of elements of *Stereum sanguinolentum* in the pouches at the anterior end of the ovipositor in species of *Sirex* (wood wasps). Flies have been proved capable of acting as vectors of sporotrichosis (Simson, Helm, Bowen & Brandt, 1947), a fungus disease among workers in the South African gold mines, though in the underground shafts and galleries the causative organism, *Sporotrichum beurmanni*, is disseminated by other insects and by water-flow (Brown, Weintroub & Simpson, 1947).

Many kinds of small animals are always found inhabiting the lower surfaces of fallen branches and humus, situations where resupinate

Hymenomycetes are common. Among such animals are woodlice, beetles, slugs, mites, spiders, centipedes, springtails, gnats, ants and worms. Specimens of some of these animals were captured and examined in one or more of the following ways:

(1) After killing the animal its gut was dissected out and the contents examined microscopically.

(2) Living animals were kept for a few hours in small boxes, and the faecal pellets which they deposited were examined microscopically.

(3) Living animals were forced to walk through a drop of water on a clean slide, and the water was subsequently examined microscopically.

Table 1. *Number and kinds of small animals examined, and the fungi which they were transporting*

Animal	Proportion of individuals transmitting fungi	Fungi transported
Woodlice	54/54	*Pleurotus tessulatus*, *Stemphylium botryosum*, *Oligonema nitens*, *Cryptocoryneum hysterioides*, *Alternaria tenuis* group, *Sporoschisma mirabile*, *Sporidesmium abruptum*, *Monotospora sphaerocephala*, *Monilia candicans*, *Polystictus versicolor*, *Pellicularia subcoronata*, *Trichothecium roseum*, *Torula herbarum*, *Epicoccum* sp., *Speira toruloides*, *Helminthosporium apiculatum*, *Sporidesmium* sp., *Dicoccum uniseptatum*, *Brachysporium bloxami*, *Merulius lacrymans*, *Helminthosporium longipilum*
Mites	3/3	*Corticium lividum*
Gall midge grub	0/1	—
Centipedes	4/4	*Pellicularia subcoronata*, *Helminthosporium longipilum*
Slugs (two were *Arion hortensis*)	3/3	*Puccinia poarum* (aecidiospores), *Fusarium* sp., *Alternaria* sp.
Springtails	4/4	*Pellicularia* sp.
Worms	2/2	Unidentified
Unknown herbarium beetle	1/1	*Polyporus radiatus*

Microscopic examination by the first two methods showed that a large proportion of the contents of the gut and faeces was of fungal origin; and in some instances the structures seen could be referred with certainty to particular species of fungi (see Table 1). To assist in identifying these fragments any fungi found growing in the restricted habitat in which the animals were captured, were brought back to the laboratory and identified. From Table 1 it will be seen that out of a total of seventy-two animals investigated, only one failed to show evidence of having ingested any fungus material. The majority of fungi listed in Table 1 are Hyphomycetes, one reason for this being that their conidia are specifically more distinctive than the spores of most Basidiomycetes or other fungi. In the microscopic preparations, however, there were a great number of basidiospores as well as other kinds of spores and hyphal detritus which could not be identified. The faecal pellets also contained more or less the same fungus elements as were present in the gut of the same species of animals captured at the same time. The proportion of fungus material varied considerably; it was high in the springtails, and lower in woodlice which appear to have a varied diet of wood, algae, nematodes, fungi, and other substances which could not be recognized.

Mechanical transport of spores was demonstrated by allowing woodlice to walk over the hymenium of a fresh specimen of *Merulius lacrymans* and sometime later forcing the woodlice to walk through a drop of water on a clean slide, where innumerable spores of the test fungus were found to be deposited. *M. lacrymans* was selected for this test because its spores are so easily distinguished. The test was repeated with woodlice which had been captured on a piece of wood bearing *Pleurotus tessulatus*, and again the highly characteristic spores of this species were present in large numbers in the water-drop.

Microscopically, spores appear quite normal after passage through the digestive tract of these animals; the question now arises whether these spores are viable. Germination experiments were conducted on spores found in the faecal pellets of woodlice which had been kept in moist boxes in a cool part of the laboratory. The pellets were suspended in a drop of tap water in van Tieghem cells for 24 and 48 hr., and many hyphomycete conidia germinated successfully but no basidiospores germinated. This does not afford positive evidence that the basidiospores were non-viable, for basidiospores also failed to germinate when taken freshly from fructifications of *Pellicularia subcoronata* and *Merulius lacrymans*, two species on which some woodlice were fed and whose basidiospores appeared in great numbers in the faeces. Successful germination of basidiospores depends on securing correct experimental conditions and suitable nutrients (Duggar, 1901), often highly specialized, and it is hardly to be expected to occur within a few hours in ordinary tap water.

Germination of basidiospores of *M. lacrymans*, recovered from faeces of woodlice, was successfully accomplished by Mr E. C. Badcock of the Forest Products Research Laboratory, Princes Risborough, from samples which the writer sent him. Mr Badcock reported germination of a few of the spores after 14 days in van Tieghem cells containing a medium made of 8 % malt, 3 % agar and 1 % phosphoric acid, incubated at 22° C. With fresh spores, the same medium usually induces germination after only 6 days (Findlay, 1933), but germination is sometimes delayed and is increasingly slow and difficult when older spores are used. Even with fresh spores only about 25 % germinate. Here it should be mentioned that the fructification on which the woodlice were fed had recently been treated with an antiseptic wood-preservative which readily checks the growth of *M. lacrymans* (Cartwright & Findlay, 1938, p. 85) in comparatively low concentrations. It is a sensitive fungus, difficult to grow artificially, and therefore a good test organism for these experiments. No suggestion is made here that *M. lacrymans* is normally distributed by insects in houses. Passage through the digestive tract of woodlice seems to increase the time required for spores to germinate, and to decrease the number of spores which can be induced to germinate. A precisely similar effect was obtained by Gordon (1938) in germinating spores of *Ustilago avenae* after passage through the beetle *Cartodere filum*.

Field observations on the habits of some of these small animals are of interest from the point of their association with fungi. Springtails are delicate, and even more sensitive to dryness and heat than the other animals which were studied. All these animals prefer the lower sides of logs and humus where it is cooler and usually moist. During a spell of extraordinarily hot weather, large numbers of gnats were seen on top of, and beneath, logs of birch which had been under observation for several months, but the usual population of woodlice and springtails had vanished deep into the underlying humus. Centipedes and mites apparently were less sensitive to the hot dry conditions, but fewer of them were seen than was customary. In cooler damp weather the lower surface of the same logs always bore a large and varied population of active insects. The insects are therefore most active under conditions which also favour the growth and spore production of the lignicolous fungi.

It may be noted, incidentally, that, with the exception of mites, the animals studied appeared to prefer feeding on the vegetative parts of the fungi, but they invariably ingested innumerable spores as well. Woodlice burrow into cracks and eat their way into rotten wood, and in so doing they deposit the spores in a very favourable place for subsequent germination and development. Leach (1940, p. 102) mentions the assistance afforded to *Peniophora gigantea* by *Monochamus* beetles in penetrating the heartwood of conifers in a radial and tangential direction, a process which the fungus alone has difficulty in accomplishing.

The above experiments and observations concern only a few species of fungi and a few of insects, but they demonstrate that the animals which commonly live in association with lignicolous fungi transport the spores and that the spores may remain viable after transport. These animals can move rapidly and possibly travel relatively far within woods. They are of prime importance in the dispersal of spores of resupinate Hymenomycetes and many lignicolous Hyphomycetes. The very common occurrence of resupinate fungi in situations which, so far as can be judged, are wholly sheltered from air currents shows that they have good dispersal mechanisms. Such habitats, in fact, include agents which are fully effective under those special conditions, and further study might well bring to light evidence of specialization to habitat conditions among resupinate fungi, quite different from, but as interesting as, the mechanisms which Buller and others have described in the higher Hymenomycetes.

As a further alternative to anemochorous dispersal of spores the agency of water-splash was given consideration. In laboratory experiments small drops of water were allowed to fall from the height of 1 cm. on fresh fruit-bodies of *Merulius lacrymans*, *Pellicularia subcoronata* and *Corticium comedens*. The hymenophores were tilted so that the water-drops flowed off singly on to glass slides. Microscopic examination of the drops showed that numerous spores could be dislodged and carried away in this manner. It is probable that the same process may take place in nature, either by a flow of water passing beneath logs and humus, or by splashes of raindrops falling on exposed hymenia. The extent to which this occurs in nature cannot be estimated but may well be considerable.

Both water- and insect-dispersal operate on spores at all stages of development, whereas wind-distribution affects only the mature spores liberated by the fungus itself. But only an infinitesmal proportion of the millions of spores carried by wind can give rise to new individuals, and where the nature of the habitat precludes anemochory the agencies of insects and water are valuable alternatives.

The observations recorded in this paper formed a section of a thesis submitted for the Ph.D. Degree in the University of London. The work was undertaken while the author was occupying the post of South African Assistant at the Herbarium of the Royal Botanic Gardens, Kew. I am deeply indebted to Dr B. Barnes for valuable guidance, and to Mr S. J. Hughes for assistance in the identification of some of the Hyphomycete conidia.

REFERENCES

Brown, R., Weintroub, D. & Simpson, M. W. (1947). Timber as a source of sporotrichosis infection. In *Sporotrichosis Infection on the Mines of the Witwatersrand.* Johannesburg: Transvaal Chamber of Mines.

Buller, A. H. R. (1909). *Researches on Fungi*, vol. i. London: Longmans, Green and Co.

Buller, A. H. R. (1922). *Researches on Fungi*, vol. ii. London: Longmans, Green and Co.

Cartwright, K. & Findlay, W. P. K. (1938). *Principal Decays of Softwoods used in Great Britain.* London: H.M. Stationery Office.

Duggar, B. M. (1901). Physiological studies with reference to the germination of certain fungous spores. *Bot. Gaz.* **31**, 38–66.

Findlay, W. P. K. (1933). The germination of the spores of *Merulius lacrymans* (Wulf.) Fr. *Trans. Brit. mycol. Soc.* **17**, 334–335.

Gordon, H. D. (1938). Note on a rare beetle, *Cartodere filum* Aubé, eating fungus spores. *Trans. Brit. mycol. Soc.* **21**, 193–197.

Johnson, M. E. M. (1920). On the biology of *Panus stypticus*. *Trans. Brit. mycol. Soc.* **6**, 348–352.

Leach, J. (1940). *Insect Transmission of Plant Diseases.* New York: McGraw Hill.

Simson, F. W., Helm, M. A. F., Bowen, J. W. & Brandt, F. A. (1947). The pathology of sporotrichosis in man and experimental animals. In *Sporotrichosis Infection on the Mines of the Witwatersrand.* Johannesburg: Transvaal Chamber of Mines.

Spaulding, P. (1903). The relations of insects to fungi. *Plant World*, **6**, 182–184.

Wolf, F. A. & Wolf, F. T. (1947). *The Fungi*, vol. ii. New York: Wiley.

A STUDY OF RUSTS FOUND ON *PEDICULARIS*

By H. F. DOVASTON

West of Scotland Agricultural College, Auchincruive

and C. C. V. BATTS

National Institute of Agricultural Botany, Cambridge

(With Plates 4 and 5 and 15 Text-figures)

This paper brings together the descriptions of five species and one subspecies of *Puccinia* recorded on *Pedicularis*: *Puccinia paludosa* Plow., *P. pedicularis* Thüm., *P. lapponica* Rytz, *P. lapponica* subsp. *jenissejensis* Tranz., and *P. clintonii* Peck. *P. oederi* Blytt is shown to be a synonym of *P. pedicularis* Thüm. The original descriptions are revised, world distribution is given, and all species are illustrated. Evidence from comparative morphology and geographical distribution is used to suggest possible relationships of these rusts.

Most members of the genus *Pedicularis* are root-parasites, and some in turn may be parasitized by species of *Puccinia*. Five species and one subspecies of *Puccinia* have been recorded on *Pedicularis*. *Puccinia paludosa* Plow., which is macrocyclic, is well distributed in Europe (including Britain), and is fairly well known. The other species, *P. pedicularis* Thüm., *P. lapponica* Rytz, *P. lapponica* subsp. *jenissejensis* Tranz., and *P. clintonii* Peck, are rare rusts known only from a few collections.

These studies followed our discovery of a rust on *Pedicularis palustris* L. during the Society's Foray in Northern Ireland in 1948. We have identified this rust as a leptosporic form of *Puccinia clintonii* Peck, a species known from America and from one collection made in Japan. Apparently there are no herbarium specimens of this species in Europe, but *P. clintonii* is inconspicuous, and may not be as rare as has been thought. For example, two mycologists who knew of the Irish find and had seen a specimen, have since collected *P. clintonii* on *Pedicularis sylvatica* L. in north-west Scotland. It is possible that *Puccinia pedicularis* Thüm. may be found if a thorough search is made in the coldest parts of the Scottish Highlands. *P. lapponica* Rytz is less likely to occur in Britain.

DESCRIPTIONS

The description of *P. oederi* Blytt is taken from Sydow & Sydow (1904), and the other descriptions are from the originals, translated where necessary. An account of *P. clintonii* is taken from Arthur (1922). Except for Text-fig. 1, our illustrations are original.

Macrocyclic species

Puccinia paludosa Plowright, in *British Uredineae and Ustilagineae*, 1889, p. 174. (Text-fig. 2.)

'*Aecidiospores*—Pseudoperidia irregularly clustered on the leaves, petioles, peduncles, stems, and sometimes even on the calices, sub-immersed, with torn white edges. Spores subglobose, echinulate, hyaline, with orange contents, 15–28 × 10–16 μ.

'*Uredospores*—Sori small, oval or elongated, on yellowish spots, light brown, soon naked and pulverulent. Spores round, rarely oval, brown, rough with small, sharply pointed, not very numerous warts, 20–25 μ.

'*Teleutospores*—Sori small, oval or elongate, rarely roundish, often in linear series, black, naked. Spores, upper cell rounded and thickened above, often obliquely, lower cell subcylindrical or cuneiform, constriction rather marked, smooth, dark brown, 50–60 × 18–20 μ. Pedicels rather long, brownish, persistent.

'Aecidiospores on *Pedicularis palustris* [L].

'Uredospores and teleutospores on *Carex vulgaris* [*C. goodenowii* Gay], *C. stricta* [Good.], *C. fulva* [Host.], and *C. panicea* [L.]'

Specimen examined. On *Carex goodenowii* Gay, Stolpmünde, Pomerania, coll. P. Sydow, 9 August 1890. Sent by R. W. G. Dennis.

The diploid phase is of the same morphological type as *Puccinia caricina* DC. and there has been much confusion of records. Hasler (1930) has shown that *Carex elata* All. can act as a host. Jørstad (in litt.), considers *C. fusca* Host. is probably everywhere the chief diplont host, but suggests that *Puccinia paludosa* may be able to infect various distigmatic *Carex* species.

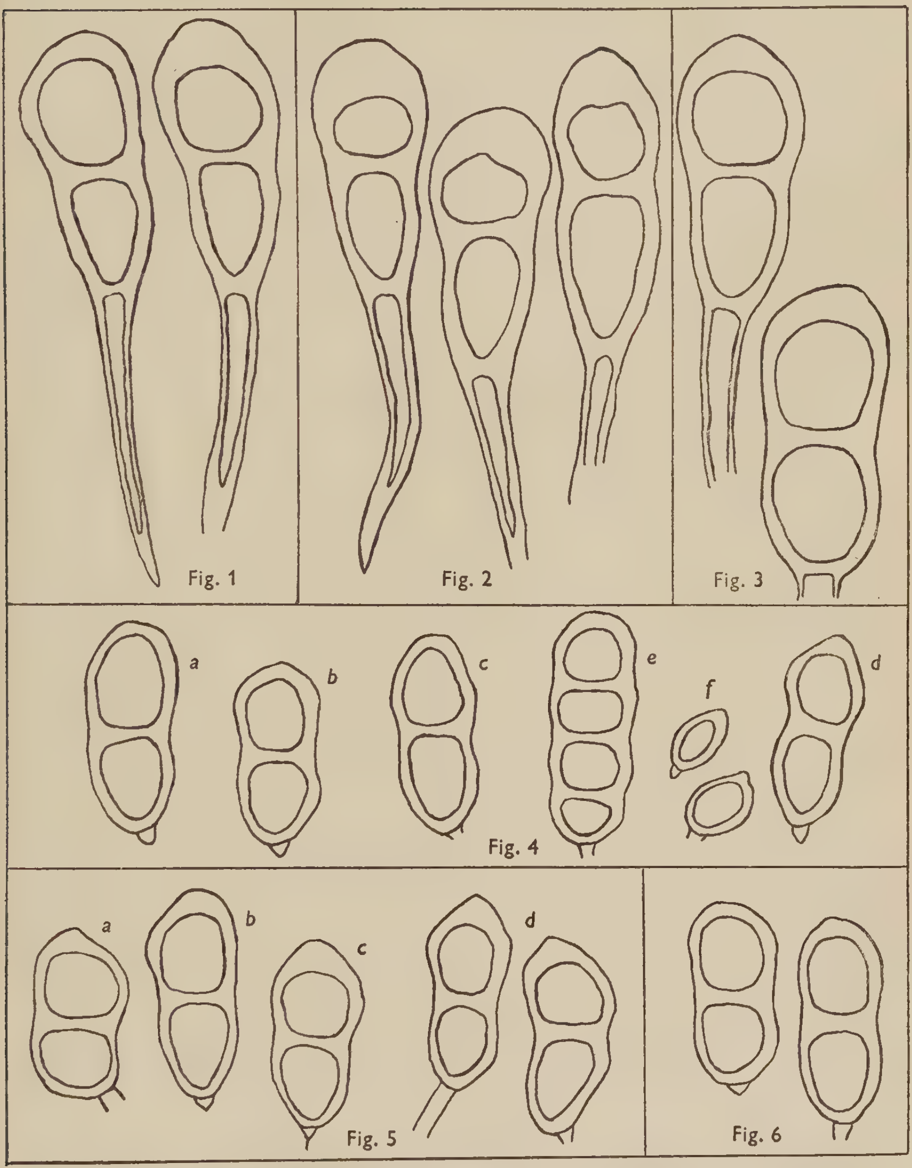
Distribution. On *Pedicularis palustris* L.: Europe from France, Belgium, Great Britain (including the Orkneys); eastwards to Leningrad and Moscow region, Ukraine; southwards to French, Swiss and Austrian Alps; northwards to about 64° N. in Sweden, Norway, Finland and Russian Karelia. Found at altitudes up to 650 m. in Norway. On *P. sylvatica* L.: recorded from Jutland, Bavaria, Silesia, Switzerland and Galicia. Some collections may have been incorrectly named *P. sylvatica*, and these records are dubious. For example, Fuckel (1875) recorded *Puccinia paludosa* on *Pedicularis sylvatica* at Graubunden, but according to Hegi, *P. sylvatica* does not grow in this part of Switzerland. *P. sylvatica* is fairly common in south Norway and south Sweden, but it has never been found there with aecidia (Jørstad, in litt.). On *P. laeta* Stev.? Minusinsk district in Siberia, Tranzschel (1939). On *P. grandiflora* Fisch. Ussuri district in Far Eastern Siberia (Tranzschel, 1939). On *P. resupinata* L. Kamchatka (Jørstad, 1933). On *P. mexicana* Succ. Mexico State *N. Amer. Flora* (1926).

Microcyclic species

Puccinia lapponica Rytz, *Veröff. geobot. Inst. Rübel*, 1927, pp. 84–85. (Text-fig. 3; Pl. 5, figs. 7, 10.)

'*Teleutospores*—Sori amphigenous, on leaf stalks or calyces, round or oblong 2–3 mm. × 1 mm. sometimes confluent, compact, dark brown, naked.

'Spores clavate, apices rounded or truncate, markedly thickened (5–8 μ), constriction marked, lower cell cuneiform, smooth, dark brown, upper cell darker than lower, germ pore of the upper cell near the crown, of the



Text-fig. 1. *Puccinia lapponica* Rytz subsp. *jenissejensis* Tranz. Text-fig. 2. *P. paludosa* Plow. Text-fig. 3. *P. lapponica* Rytz, type specimen. Text-fig. 4. *P. pedicularis* Thüm., Greenland: *a–d*, normal spores; *e* and *f*, four-celled and unicellular spores (see Pls. 4 and 5). Text-fig. 5. *P. clintonii* Peck: *a*, resting spore Sierra Madre (coll. *d*); *b*, ditto leptospore; *c*, resting spore type specimen (coll. *a*); *d* and *e*, resting spores Oconto (coll. *c*). Text-fig. 6. *P. oederi* Blytt, type specimen. Text-fig. 1. redrawn and enlarged from Tranzschel (1933), magnification not stated but approximately × 800. Text-figs. 2–6, × 800.

lower cell near the dividing wall, 42–51 × 22–23 μ. Pedicel long, as long as the spore, hyaline.

'Habitat: on leaves and stalks of *Pedicularis lapponica* in the mountains of Luossavaara near Kiruna. Related to *Puccinia paludosa* Plow.'

Specimen examined. On *Pedicularis lapponica* L.: Des Gippels des Luossavaara (bii Kiruna). Coll. W. Rytz, 25 July 1925. *Type specimen*: sent by Dr Rytz per R. W. G. Dennis.

Distribution. In addition to the type locality, also known from the following collections: on *Pedicularis lapponica* L., Mt. Nuolja in Torne Lappmark, Lundell and Nannfeldt (Fungi Exsicc. Suec. 1632, 1948). Mt. Kukisvumtchorr, Kola Peninsula (Kolski Poluostrov), Tranzschel (1939).

Puccinia lapponica subsp. **jenissejensis** Tranzschel, *Acta Inst. Bot. Acad. Sci., U.S.S.R.*, Ser. II, fasc. I, 1933, p. 270. (Text-fig. 1.)

'*Teleutospores*—Sori hypophyllous or amphigenous, in scattered groups, on yellow spots small 1–1½ mm. diameter, surrounded by the broken epidermis, compact dark.

'Spores oblong or clavate, apices rounded, thickened (about 6 μ), middle gently constricted, narrowed or more rarely rounded at base, smooth, brown, 36–53 × 19–27 μ. Pedicel up to 36 μ long, persistent.

'Habitat: on leaves of *Pedicularis euphrasioides* Steph. near the port at the mouth of the Jenisseji. (Yenisei.)'

Distribution. This is the only record; the station is 73° N., and apart from the Greenland station of *Puccinia pedicularis* is the most northerly station for a *Pedicularis* rust. We have not seen a specimen but we think this subspecies may not be distinct from *Puccinia lapponica* proper.

Puccinia oederi Blytt, *Chra. Vidensk-Selsk. Forhandl.* no. 6, 1896. (Text-fig. 6.)

'*Teleutospores*—Sori epiphyllous, without spots, small, about 1–1½ mm. diameter, inconspicuous, round, epidermis thin, sori at length free or almost free, powdery brown.

'Spores oblong or subfusoid, apex rounded or attenuated, not thickened, middle smoothly constricted, base rounded, verruculose, golden brown, 30–38 × 11–15 μ. Pedicel hyaline, slender, deciduous, up to 25 μ long.

'Habitat: on living leaves of *Pedicularis oederi* Vahl, Norway.'

Specimen examined. On *Pedicularis oederi* Vahl, Dovre, Jerkin, coll. A. Blytt, 6 August 1888. *Type specimen*: sent from Herb. Blytt, Oslo Botanisk Museum, by I. Jørstad. Although the holotype of *Puccinia oederi*, this was labelled *Puccinia pedicularis* Thüm. by Blytt.

P. oederi Blytt should clearly be included under *P. pedicularis* Thüm., a possibility which Blytt considered. He was not quite sure of the identity and tentatively published the name *P. oederi* (Jørstad, 1935). The holotype of *P. oederi* is well covered by the diagnosis of *P. pedicularis*.

Puccinia pedicularis Thümen, *Bull. Soc. Nat. Moscou*, 1878, p. 215. (Text-fig. 4; Pl. 5, figs. 8, 11.)

'Sori epiphyllous, very large, grouped, free, disc-shaped, deforming the leaf, surrounded by pale epidermis, chestnut brown, without spots.

'*Teleutospores*—more or less clavate, apex somewhat blunted, middle constricted, base cuneiform, homogeneous, dusky (30–33 × 14–16 μ), epispore thin, equal, somewhat undulated. Pedicel short, cone-shaped, gradually tapering upwards, hyaline paraphyses nil.

'Growing on the leaves of an undetermined species of *Pedicularis*; alpine zone of Mt. Borus.'

Specimen examined. On *Pedicularis flammea* L., north-east Greenland between 72° 20′ N. and 74° 10′ N. Coll. A. Hagan. From Oslo Botanisk Museum per I. Jørstad and R. W. G. Dennis.

Distribution. On *Pedicularis oederi* Vahl.: Dovre Mountains in Norway, and mountains of Härjedalen and Jämtland in Sweden. According to Jørstad (in litt.), this rust is rare and local in Norway. It has been collected six times, at altitudes of 780–1000 m. at three centres no more than 20 km. apart. On *P. flammea* L.: collected between 72° 20′ N. and 74° 10′ N. in Greenland, the most northernly station for any *Pedicularis* rust. On *P. oederi* Vahl. Mt. Pilatus, Switzerland (Hasler, 1930); Mt. Smreciny, Czechoslovakia (Urban, 1948.)

Puccinia clintonii Peck, *Ann. Rep. N.Y. St. Mus.* **28**, 1876, p. 61. (Text-figs. 5 and 7–15; Pl. 4, figs. 1–6; Pl. 5, fig. 9).

'Spots absent, sori amphigenous, clustered or scattered, brown.

'Spores oblong, slightly constricted ·0011″–·0014″ long, [27·5–35 μ]. Leaves of *Pedicularis*. Goat Island, Clinton, October.'

Arthur (1922), gave a much fuller description of this interesting rust as follows:

'O Pycnidia unknown, probably not formed.

'III Telia hypophyllous and caulicolous rarely epiphyllous, usually scattered and solitary on discoloured often sunken spots, round, large 0·5–1·5 mm. across, the resting form tardily naked, pulverulent, chestnut brown, ruptured epidermis conspicuous, the germinating form compact pulvinate, at first light cinnamon brown, becoming cinereous by abundant germination, ruptured epidermis not conspicuous; teliospores ellipsoid, oblong or broadly clavate 15–18 × 26–36 μ, rounded or obtuse above, rounded or narrowed below, usually strongly constricted at septum. Wall golden brown or nearly colourless in the germinating form, cinnamon brown in the resting form, 1·5–2 μ thick, thickened above, often with sub-hyaline umbo 3–6 μ very finely striate-verrucose in longitudinal lines, germinating form often smooth, pedicel colourless, fragile, equalling spore, commonly deciduous.'

Specimens examined. (*a*) On *P. canadensis* Benth., Goat Island, Niagara. Coll. G. W. Clinton, 1876. *Type specimen*: sent by H. D. House from Herb. N.Y. State Museum. (*b*) On *P. bracteosa* Benth., Laggan, Alberta, Canada. Coll. A. W. Holway, 22 August 1902. Issued in E. Barth Fungi Columb. 5054. (*c*) On *P. canadensis* L., Oconto Co., Wis., U.S.A. Coll. J. J. Davis, 25 July 1909. Ex. Herb. Arthur 40734. (*d*) On *P. paysoniana* Pennell, Sierra Madre Mts., Wyo., U.S.A. Coll. W. G. Solheim, 13 July 1939. Ex. Herb. Arthur 48908. (*e*) On *P. resupinata* L., Daisenji, Prov. Hôki, Japan. Coll. N. Hiratsuka and M. Yoshida, 23 August 1929. Ex. Herb. Arthur F 7501. (Position of this station is 35° 21′ N. and 133° 33′ E.) (*f*) On

P. groenlandica Retz., Big Springs, Idaho, U.S.A. Coll. F. S. Wolpert, 1 September 1917. Ex. Herb. Arthur 40728. Specimens (*b*) to (*f*) sent by G. B. Cummins, Purdue University, Indiana. (*g*) On *P. palustris* L., Clandeboye Demesne, Northern Ireland. Coll. H. F. Dovaston and C. C. V. Batts, 14 September 1948. (*h*) On *P. sylvatica* L., Shieldaig, W. Ross, Scotland. Coll. A. Kerr and D. Henderson, June 1950. Specimen from D. Henderson, Royal Botanic Garden, Edinburgh.

Distribution. North America: on *P. groenlandica* Retz., Idaho; on *P. bracteosa* Benth., Colorado, Oregon, Alberta; on *P. canadensis* L., Michigan, New York, Wisconsin, Maine, and from New Mexico where it was recorded on *P. fluviatilis* A. Heller, a synonym of *P. canadensis* L.; on *P. racemosa* Dougl., Oregon, Alberta; on *P. paysoniana* Pennell, Wyoming. Japan—on *P. resupinata* L., Daisenji, Japan. Europe—on *P. palustris* L. Clandeboye, Northern Ireland; on *P. sylvatica* L., Shieldaig, Wester Ross, Scotland.

Type locality. Goat Island, Niagara.

Particular attention has been paid to *Puccinia clintonii* because of its discovery in Ireland and Scotland, and because a wide range of specimens have been seen. The letters in the notes below refer to the list of specimens of *P. clintonii* above.

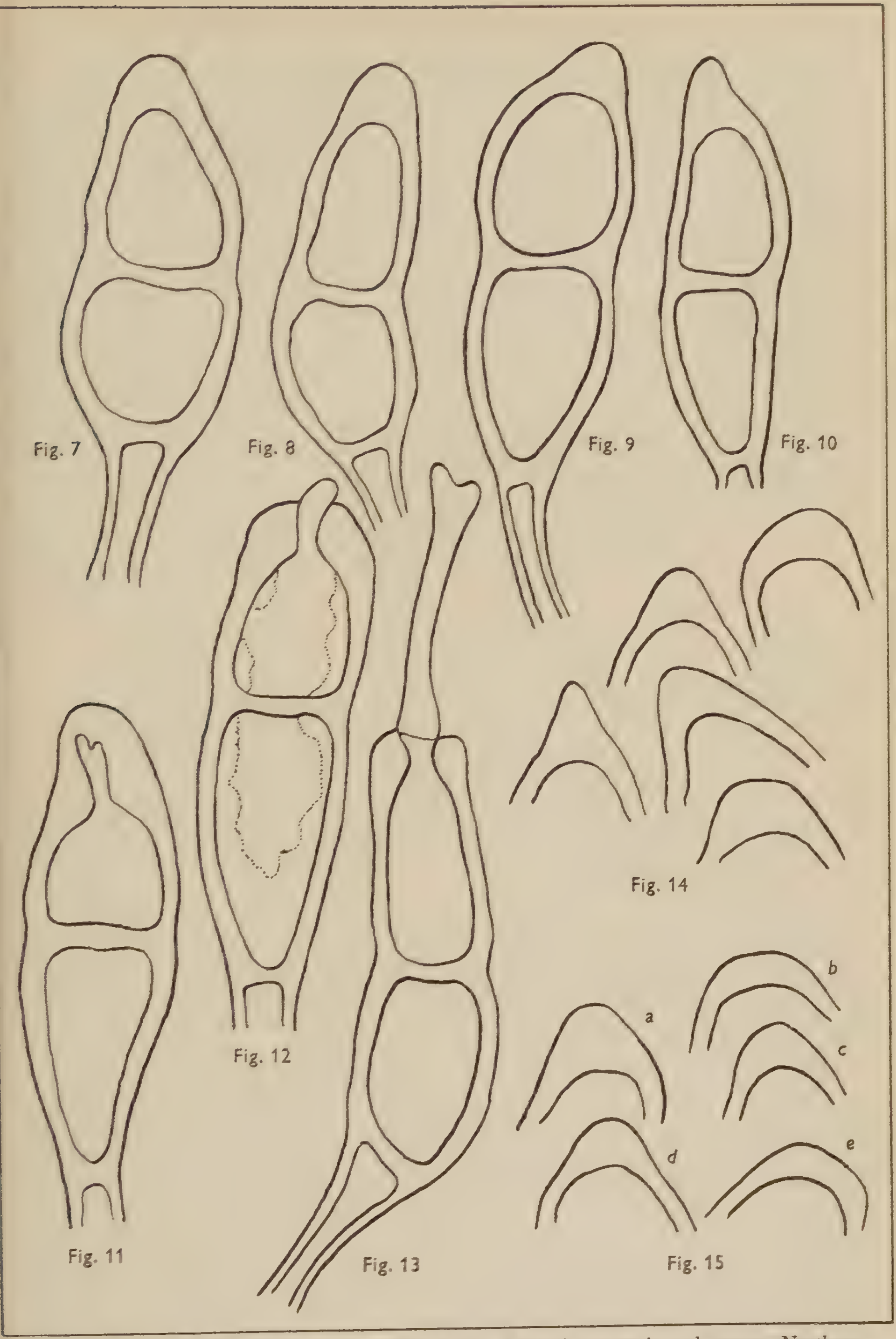
Sori

The sori can be found on the stems, the petioles, on both sides of the leaves and even on the calyx. Some collections differ in location of the sori. The Irish material (*g*), for example, is hypophyllous, but the Scottish collection (*h*) is amphigenous, with sori on the bracts and calyx as well as on the leaves and stems. The torn epidermis is usually more obvious in microsporic than in leptosporic sori. The diameter of the sori varies from 0·5 to 1·0 mm., and the colour varies from reddish brown to chocolate. Sori of the leptosporic collections are compact and firm in texture (*e*, *g* and *h*). Sori of mixed leptospores and resting spores (*d* and *f*), or of resting spores alone (*a* and *b*), are pulverulent and much easier to spread on a slide.

As noted by Arthur, leptospores germinate readily, and sori in which they are present become cinereous. All that can be said in common of all collections is that sori are pulvinate, 0·5–1·0 mm. in diameter, and brown in colour.

Spores

Three of the collections are entirely leptosporic (*e*, *g* and *h*), two show mixed resting and leptospores (*d* and *f*), and in three collections (including the type) only resting spores were seen (Pls. 4 and 5). No great weight can be attached to the apparent absence of leptospores, especially in the older collections. The leptospores are rather fragile, tend to fragment, and are not easily seen in collections in which surface texture of the resting spores is not obviously striate. On a limited count, there seemed to be a higher proportion of resting spores to leptospores in the northern Alberta collection (*b*) than in the Wyoming material (*d*). The altitude of these two stations is not stated, so we know nothing of the climate at the two places and cannot say if this apparent difference may be real. It might be



Text-figs. 7–15. *P. clintonii* Peck. Text-figs. 7–10. Typical ungerminated spores, Northern Ireland (coll. *g*). Text-figs. 11–13. Stages in germination, apparently always apical in this material. Text-fig. 14. Apical caps of leptospores Northern Ireland. Text-fig. 15. Apical caps: *a*, resting spore (Oconto *c*); *b* and *c*, leptospores (Sierra Madre *d*); *d* and *e*, ditto resting spores. All × 1600.

expected that the proportion of resting to leptospores would be higher in a rigorous climate than in a milder one, and future collectors in America might test this suggestion.

Resting spores in all collections are broadly clavate, rounded at the apex and the base, and markedly constricted at the middle. The cell wall at the apex is distinctly thickened, and may be peaked or comparatively flat (Text-figs. 14, 15). Immature resting spores are colourless like the leptospores, but are distinguished by the general shape, and by the presence of a characteristic surface texture. Mature resting spores are a clear transparent brown and often show an apparent apical papilla. When the spores are drawn or photographed it is seen that this papilla is an optical illusion due to non-pigmentation of a small area at the top of the spore (Pl. 2, fig. 3).

The most characteristic feature of this species is the surface texture of the resting spores. The undulate longitudinal folds are difficult to draw but show well in a photograph (Pl. 4, fig. 3, 4). These folds vary in degree of development, can be seen on all resting spores under high power if the lighting is correctly adjusted, and are formed well before the spore is mature. Unfortunately it is not a diagnostic character for the leptosporic collections, in which the spores are always quite smooth. The leptospores in all collections are clavate-oblong, with a tapering basal cell and a less marked median constriction. They bear a stout, persistent pedicel in comparison with the small hyaline cone on most of the resting spores (Pl. 4, figs. 1, 2). Previous descriptions of the pedicel in *P. clintonii* and *P. pedicularis* are inconsistent, and the nature of the pedicel is discussed later.

Table 1. *Spore sizes of* Pedicularis *rusts*

	Spore type	Mean length and standard error	Mean width and standard error	Length range	Breadth range	Mean pedicel length
P. paludosa	R	49·8 ± 0·9	16·7 ± 0·3	43–59	13–20	—
P. lapponica	—	44·9 ± 0·6	20·0 ± 0·3	39–49	16–26	—
P. oederi	R	29·5 ± 0·5	16·5 ± 0·3	23–36	11–20	—
P. pedicularis	R	32·0 ± 0·3	13·9 ± 0·2	26–36	11–16	—
P. clintonii a	R	34·1 ± 0·4	15·7 ± 0·2	26–39	13–19	4·5
b	R	32·3 ± 0·3	16·2 ± 0·2	29–39	13–19	3·6
c	R	31·2 ± 0·4	15·9 ± 0·2	26–36	13–19	3·9
d	L	33·1 ± 0·6	14·2 ± 0·3	26–39	11–16	11·6
e	L	32·8 ± 0·4	13·7 ± 0·2	26–39	11–16	13·8
f	R	35·3 ± 0·7	15·9 ± 0·2	26–46	13–19	4·7
g	L	30·3 ± 0·4	13·6 ± 0·2	26–39	10–16	10·6

For collections of *P. clintonii* see the list of specimens examined (p. 133). Spore type: R = resting spores; L = leptospores. All measurements are in μ, and corrected to first decimal place. Each measurement based on fifty spores in water.

Spore sizes are given in Table 1. These have been measured independently by both of us, and they do not always agree with measurements in earlier accounts based on the same specimens (e.g. *P. oederi* type, *P. clintonii* type). All spore measurements are based on fifty observations for each item, and a statistical comparison has been made of spore measurements of the different collections of *P. clintonii*. After very little experience all these collections can be named with certainty on unmarked slides, but slight variations in characteristic spore shape are not easily defined. Some differences of gross morphology have been found, and with ample material finer differences could no doubt be detected.

Significant differences of spore size (length and breadth) were found between some collections of *P. clintonii*. A difference significant at $P=0{\cdot}01$ was found between collections from Idaho (*f*) and Wyoming (*d*), Idaho (*f*) and Alberta (*b*), Wisconsin (*c*) and Alberta (*b*). The Alberta (*b*) and Wyoming (*d*) collections showed a difference significant at $P=0{\cdot}05$.

Leptospores do not preserve sufficiently well for accurate measurement, and these counts are based only on ample material in good condition.

The Irish specimen appears to differ from all American and Japanese leptosporic collections in that it has a very distinctly thickened and peaked apical cap. Although distinctive this is not sufficiently constant or important to justify subspecific rank.

Dr H. D. House kindly lent us the holotype of *P. clintonii* from Peck's herbarium, now in the New York State Museum. The material is very sparse, and very fragile. If at any time it should be lost or destroyed we suggest that the Sierra Madre collection (*d*) would be the most suitable neotype. To preserve the holotype, future studies could be based on the Sierra Madre specimen.

GENERAL COMPARATIVE ACCOUNT OF *PEDICULARIS* RUSTS

Texture of the sori

The sori of *Puccinia paludosa*, *P. lapponica*, and leptosporic collections of *P. clintonii* are hard and compact. The spores are borne on stout persistent pedicels. By contrast, microsporic *P. clintonii* and *P. pedicularis* have soft pulverulent sori, and dehiscent spores with fragile pedicels. The texture of the sori depends upon the mechanical strength of the pedicel, and in this respect there is a constant difference between *P. paludosa* and *P. lapponica* on one hand, and *P. pedicularis* and typical material of *P. clintonii* on the other.

Nature of the pedicel

In *P. paludosa* and *P. lapponica* the pedicel is stout, persistent, and sheds with the spore. In *P. pedicularis* (including *P. oederi*) and *P. clintonii* it is quite different, and there is some confusion in the literature.

In the diagnosis of *P. pedicularis* it is stated that '...pedicellis brevibus, ...hyalinis'. The diagnosis of *P. oederi* (a synonym of *P. pedicularis*) describes the pedicel as '...hyaline gracile deciduo usque 25 μ long'. In our Greenland specimen, and also in the type specimen of *P. oederi* we found that the pedicel is always long in the early stages, but the greater part of it collapses leaving only a fragile thread. This soon breaks, leaving the spore with a cone-shaped hyaline pedicel, or with a pedicel of irregular shape (Pl. 5, fig. 8).

There has been similar confusion with *P. clintonii*, in which the pedicel of the resting spores is similar to that in *P. pedicularis*. For example, Peck wrote '...pedicello hyaline, tenui, sporem requanti' and Arthur (1922) '...pedicel colorless, short, fragile'. Both these observations are incomplete, but if read in the order above they state correctly what happens as the spore matures. What was missed in both these descriptions was that the leptospores of *P. clintonii* have long, stout, persistent pedicels, similar to those of *P. paludosa* and *P. lapponica*. This is one of the few points of resemblance between *P. clintonii* and *P. paludosa* and *P. lapponica*. In situ the pedicels to the leptospores of *P. clintonii* are probably about 40 μ long (Pl. 4, figs. 1, 2; Pl. 5, fig. 7).

Characteristic shapes of spores

In outline, smooth spore wall, size, apical thickening, persistent pedicel, colour, and position of germ pore, *P. lapponica* closely resembles *P. paludosa*, and both are entirely different from *P. pedicularis* and *P. clintonii*.

These two last-named species have spores of somewhat similar form. The spores of *P. pedicularis*, however, are more rectangular in profile, less constricted than those of *P. clintonii*, and without apical thickening. The difference in texture of the spore surface is the most obvious and constant feature: undulate longitudinal folds on *P. clintonii*, and quite irregular sharp corrugations on *P. pedicularis*, not orientated in any particular direction, and showing in optical section as a finely corrugated outline to the spore.

RELATIONSHIPS OF THE *PEDICULARIS* RUSTS

These rusts fall quite clearly into two groups, with *Puccinia paludosa*, *P. lapponica* and its subspecies in one group, and *P. pedicularis* and *P. clintonii* in the other. These two groups are so different from each other that they have probably come from separate stocks.

Little can be said of the origin of *P. pedicularis* and *P. clintonii*. They are obviously related but quite distinct species occupying different geographical ranges.

P. lapponica and its subspecies *P. l. jenissejensis* are so similar to *P. paludosa* that they are very likely microcyclic mutants derived directly from *P. paludosa*. Rytz in his description of *P. lapponica* wrote '...the teleutospores correspond to our form of *P. paludosa*'. *P. paludosa* is probably a variable species, but we have found fairly clear differences of spore form between the type specimen of *P. lapponica* and our material of *P. paludosa*.

In *P. paludosa* the upper cell is usually broader than the lower, the latter soon tapering away to the pedicel. The lower cell in *P. lapponica* is less tapered and is often as wide as the upper cell (Table 2).

Table 2. *Spore measurements in* μ *of* Puccinia paludosa *and* P. lapponica

(Counts on twenty spores of each species.)

	Upper cell		Lower cell	
	Length	Breadth	Length	Breadth
P. paludosa	25·4	18·0	26·4	13·0
P. lapponica	22·9	19·3	21·3	18·3

The upper cell of *P. paludosa* is much darker in colour and has a thinner wall than the lower spore. In *P. lapponica* there is much less colour difference, and the wall of both cells is of much the same thickness. The median constriction is similar in both species, and both have a pronounced apical cap. In *P. paludosa* the apex is rounded, but in *P. lapponica* the apex is frequently, but not invariably, peaked. Grove (1913) figures a spore of *P. paludosa* with an off-centre germ pore. This has been noticed in our specimens of this species, but in the type specimen of *P. lapponica* the germ pore is always central.

We have not seen a specimen of *P. lapponica* subsp. *jenissejensis*, but judging from the two line drawings in Tranzschel (1933) it seems to be intermediate between *P. paludosa* and *P. lapponica*. The basal cell in the subspecies is less taped than in *P. paludosa* and more so than in *P. lapponica*. The thickness of the apical cap also seems to be intermediate, but both these characters are variable and there seems to be little difference of systematic importance between *P. lapponica* and its subspecies *jenissejensis*.

The valid species of *Puccinia* on *Pedicularis* would therefore appear to be: *Puccinia paludosa* Plow., macrocyclic, with aecidia on *Pedicularis*; *Puccinia lapponica* Rytz, closely related to *P. paludosa* and probably a microcyclic mutant from it (*P. lapponica* Rytz subsp. *jenissejensis* Tranz. probably differs very little from it); *P. pedicularis* Thüm. (*P.* = *oederi* Blytt) and *P. clintonii* Peck, two related microcyclic rusts, both probably unrelated to the others.

WORLD DISTRIBUTION OF *PEDICULARIS* RUSTS

Parasites are often intractable in experimental work, but they have certain advantages for studies on distribution. With free-living organisms account must be taken of complex edaphic and ecological factors which do not operate for obligate foliage parasites: the host is a constant and uniform substrate, and competition between parasites for leaf space is unusual. If a host is widely distributed over a continuous area, and a parasite of that host is limited to very small quantities at very few centres, factors other than those mentioned must be responsible for the rarity and erratic distribution of the parasite.

Apart from *P. incurva* Benth. in the Ecuadorian Andes, the genus is confined to the northern hemisphere, and belongs primarily to the arctic alpine flora, with a few species in temperate lowlands. Most species grow at altitudes of 2000 ft. and over, and some extend to the highest zones of plant life. The greatest concentration of species occurs in the Himalayan region.

The distribution of the recorded host species is as follows:

Hosts of Puccinia paludosa *Plow.*

Pedicularis palustris L. Labrador to Alaska, south to Quebec, the North-West Territory and Oregon, Europe southwards to north Italy and eastwards to Roumania and Russia. *P. sylvatica* L. Europe from Spain to Hungary and northwards to central Norway and Sweden. *P. laeta* Stev. Eastern Siberia. *P. grandiflora* Fisch. Siberia. *P. resupinata* L. North-east Europe to Siberia, China and Japan. *P. mexicana* Succ. Mexico.

Hosts of Puccinia lapponica *Rytz*

Pedicularis lapponica L. Canada, Labrador, and Greenland to the Arctic Sea, and from arctic Europe to north-east Asia. *P. euphrasioides* Steph. (= *labradorica* Wirsing) Arctic north America, Greenland, Siberia.

Hosts of Puccinia pedicularis *Thüm.*

Pedicularis oederi Vahl. Widely distributed throughout alpine and arctic Europe, north Asia and arctic North America. In China, Tibet and north Mongolia. *P. flammea* L. Alaska, Labrador, arctic and alpine Europe.

Hosts of Puccinia clintonii *Peck*

Pedicularis canadensis L. Nova Scotia to Manitoba, Florida, Mississippi, Kansas, Colorado and north Mexico. Grows at an altitude of 3000 ft. in Virginia. *P. paysoniana* Pennell. Rocky Mountains, Idaho and south Colorado. At altitudes up to 11,000 ft. in Colorado. *P. bracteosa* Benth. Rocky Mountains, British Columbia, Montana, Washington and Utah. *P. groenlandica* Retz. Labrador, Greenland and Hudson's Bay to Athabasca and British Columbia. Southwards in the Rockies to New Mexico, and in the Sierra Nevada in California. *P. racemosa* Dougl. British Columbia, Vancouver Island, Rockies south to Colorado. From 600 ft. in Vancouver Island to 5000 ft. on Mt. Rainier and 8500 ft. in Montana. For *P. resupinata* L., *P. palustris* L. and *P. sylvatica* L. see under *Puccinia paludosa.*

(i) Most of the hosts have a wide circumboreal distribution, some extend south to temperate alpine regions.

(ii) With the exception of *P. paludosa* the rusts are peculiarly rare, local, and in small quantity at the stations; they occupy only a very small part of the geographical range of the host species. A sparsity of records is expected from arctic America and Asiatic U.S.S.R. but not from Europe. The rusts of Norway, for example, are very well known, but Jørstad (in litt.) says that *P. pedicularis* Thüm. is very rare and local in a small area of the Dovre Mountains, and adjacent mountains over the frontier in Sweden. In Switzerland it is restricted to a small area on one mountain, and in Czechoslovakia, Urban (1948) commented: 'In the same way as in the Alps it seems to be very rare in Temnosmrecinska dolina too, although the host is frequent in the subalpine zone.' Urban further suggested that the presence of the same parasite on colonies of *Pedicularis oederi* separated by thousands of miles was an argument in favour of the view that *P. oederi* once occupied a continuous Eurasiatic area. However this may be, it does not explain the present rarity of *Puccinia pedicularis* or of *P. clintonii* and *P. lapponica.* We have no solution for this problem, but there is sufficient data to make some suggestions on distribution in relation to climate.

DISTRIBUTION OF *PEDICULARIS* RUSTS IN RELATION TO CLIMATIC ZONES

For many of the rust collections it is impossible to state the climatic conditions at the stations, particularly in alpine habitats where the altitude has not been recorded. Sometimes the collection was made at or near sea-level, or the altitudinal range is known, or may be inferred. It is then possible to make an estimate of the mean January and July temperatures. A high degree of accuracy is not possible as there are no exact weather records for many of the places, but even without precise data the climatic zonation is often sufficiently clear. Where necessary, allowance has been made for altitude, assuming an adiabatic lapse rate of 1° F. for each 300 ft.

Puccinia pedicularis is clearly suited to a more rigorous climate than *P. clintonii*. The difference in July means is particularly marked especially when it is remembered that a difference in *mean* temperature of 15° F. is equivalent to a shift of 15° in latitude.

P. paludosa in its European stations, *P. lapponica* and *P. lapponica* subsp. *jenissejensis* form a series showing increasing specialization for a cold climate. The summer is so short at Kiruna and in the Kola Peninsula (Kolski Poluostrov) that one is not surprised that *P. lapponica* is a microform. This applies with even greater force to the high arctic station at the mouth of the River Yenisei.

Nothing is known about climate at the outlying stations for *P. paludosa*. The Mexican record, if correct, is most unexpected but there are high mountains in Mexico State (Popacatepetl 17,881 ft.). We have not been able to obtain any data concerning the Siberian collections of this species. The winters are certainly very cold, but at low altitudes the summers are of good length, and as warm as southern Europe. Apart from the Mexican record, *P. paludosa* is consistently Old World in distribution, and it may be more common in favourable localities in Asiatic U.S.S.R. than these records suggest. If this is so, one would expect in such an extensive area that microcyclic mutants would arise independently at different centres. These mutants would clearly have a selective advantage where the summer is too short for the full cycle. It would not be surprising if *P. lapponica* should be found at the higher alpine levels in some of the Siberian mountain ranges.

Table 3. *Approximate January and July mean temperatures of stations for* Pedicularis *rusts*

Species and station	January mean (° F.)	July mean (° F.)
P. pedicularis:		
Greenland	0	+38
Norway	+20	+50
Siberia	−25	+50
P. clintonii:		
Oconto	+10	+68
Maine	+15	+65
Ireland (oceanic)	+42	+58
Japan (suboceanic)	+25	+62
P. paludosa:		
Various European	+20 to +40	<65
P. lapponica:		
All three stations	+10 to +15	50 to 55
P. lapponica subsp.? *jenissejensis:*		
Russia	−22	+40

A study of the distribution shows that great distances separate the stations for *P. pedicularis*. From Norway to Greenland is 1200 miles, from Norway to Switzerland 950 miles, and from Switzerland to the type locality in Siberia 4000 miles. Apart from the small group of colonies in Norway and Sweden these stations are completely isolated from each other.

Reference to Table 3 shows entirely different climatic types for the three localities for *P. pedicularis*: (1) Greenland (high arctic), the July mean is only 6° F. above freezing-point and there is enforced dormancy for nearly

9 months of the year; (2) Norway (low arctic), although fairly high in latitude Norway is warmed by the Atlantic Drift, and the quoted temperature range could almost be matched in the highest and coldest parts of the Scottish Highlands; and (3) Alpine Siberia (extreme continental climate), annual range of means 75° F. (two and a half times that of Norway), and the very low January mean of −25° F.

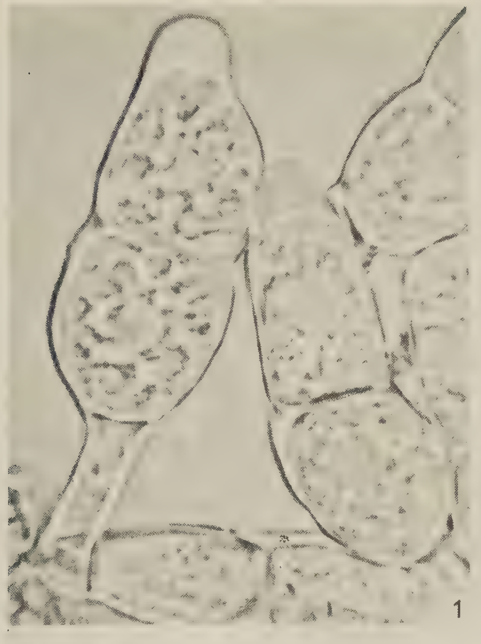
It is suggested that these colonies in extreme isolation are distinct, specialized races, whatever their morphological similarity may be. The term 'race' is used in a non-commital sense; too little is known to suggest one of the many genetical terms applied to subspecific units.

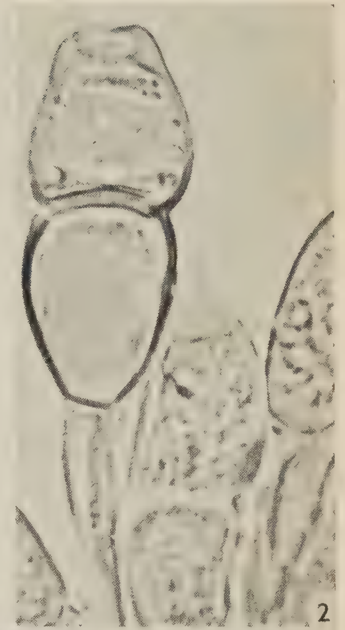
There is a considerable literature on climatic specialization within species of flowering plants. Some races are morphologically similar, but in others there are convenient 'marker' characters. For example the alpine and north temperate form of *Saxifraga aizoides* has yellow flowers, the low arctic form from Norway and South Greenland has orange flowers, while the high arctic form in North Greenland has purple flowers. One may consider on systematic grounds that *Puccinia lapponica* subsp. *jenissejensis* belongs to *P. lapponica*. However, the Scandinavian and Russian collections should probably be considered separate microcyclic mutants from *P. paludosa*, one suited to an arctic climate, the other to a high arctic climate.

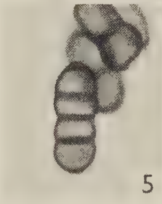
The Scandinavian stations for *P. lapponica* are just outside the main area occupied by *P. paludosa*. The River Yenisei station for *P. lapponica* is 3000 miles from the main *P. paludosa* area, and is much closer to the isolated Siberian locality for *P. paludosa*.

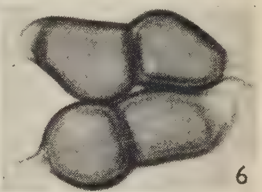
Isolation is followed by divergence, and we have shown that there are highly significant differences in spore size between collections of *P. clintonii* from some of the American stations. It is not suggested that these variations in spore size are necessarily adaptive. Wright (1931, 1940*a*, *b*) has shown that in isolated colonies of rare species the smaller the effective size of population, the greater are random variations in gene frequencies, and the less effective becomes selection pressure. For this reason the systematist should allow a fairly wide penumbra in the diagnosis of rare and local species.

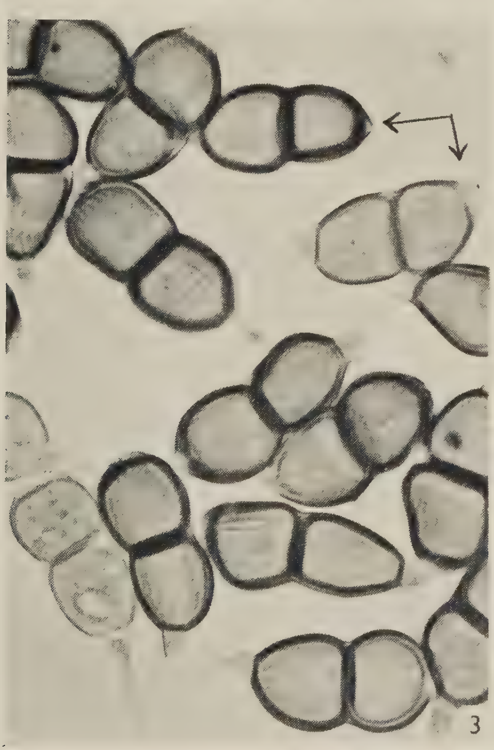
The Irish and Japanese collections of *P. clintonii* are entirely leptosporic. Both these stations are oceanic, but the winter at the Japanese station is colder than in Ireland because of altitude. Even so, both of them are very much warmer in winter than the American stations, and in Ireland leptospores could germinate at any time of the year. We found that the Irish and Scottish material germinated within a few hours if kept moist, and all the spores of the Japanese collection had germinated and were empty. The absence of resting spores in these collections may be an adaptation to a mild winter which renders resting spores unnecessary. There is, however, an alternative explanation for which we are indebted to Dr Jørstad. Some rusts do not form resting teleutospores on all their hosts. *Puccinia heucherae* Schw. is an example. However, it would be a remarkable coincidence if the two species of *Pedicularis* in the two oceanic stations should be the exception, while the six *Pedicularis* species in the continental station produce both types of spores.

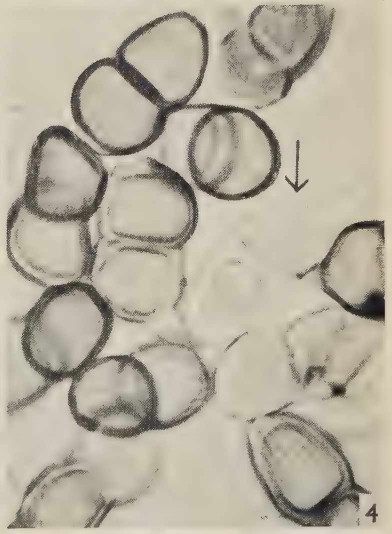

1

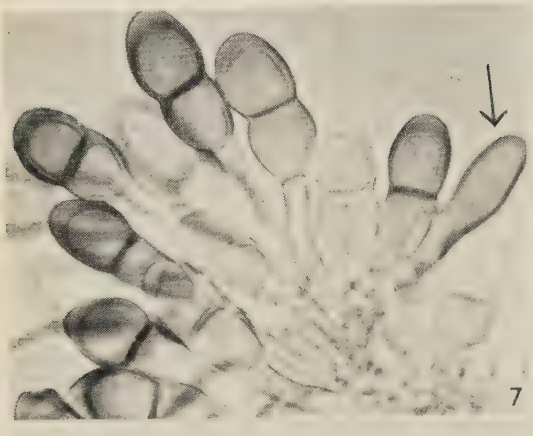

2

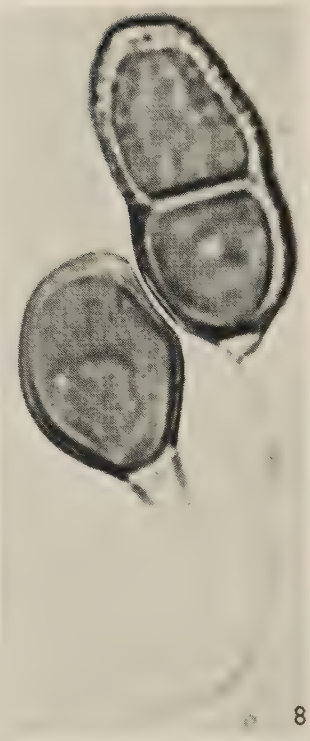

5

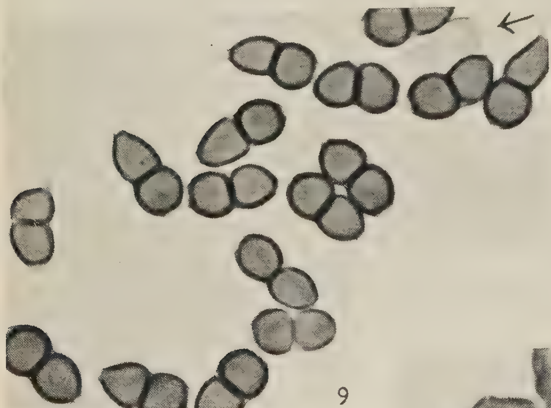

6


3

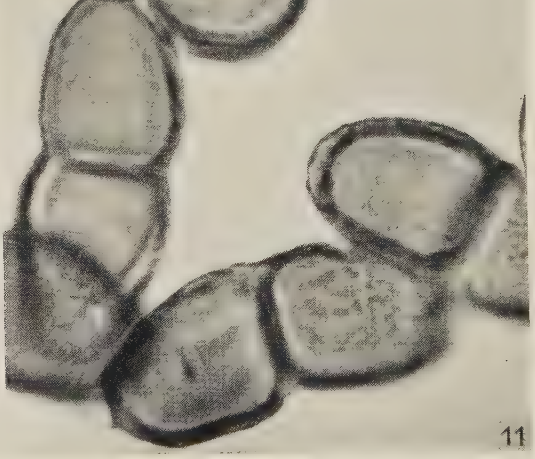

4


7


8


9

10


11

For the loan or gift of specimens we are much indebted to Dr G. B. Cummins of Purdue University, Indiana, Mr D. Henderson, Royal Botanic Garden, Edinburgh, and Dr H. D. House, New York State Museum. Dr G. Taylor, British Museum, kindly helped with listing world distribution of *Pedicularis*, and Dr R. W. G. Dennis has helped greatly with literature and with the supply of specimens. We have had specimens, references, and information from Dr I. Jørstad of Botanisk Museum, Oslo. From his unique knowledge of arctic rusts he has given us facts and critical comments for which we are most grateful.

REFERENCES

ARTHUR, J. C. (1922). *N. Amer. Flora*, **7**, 264. N.Y. Botanic Gardens.

FUCKEL, L. (1875). *Aecidium Pedicularis* Libosch etc. *Symb. mycol.* **3** (Nachtr. 36).

GROVE, W. B. (1913). *The British Rust Fungi* (*Uredinales*). Cambridge University Press.

HASLER, A. (1930). Beiträge zur Kenntnis einiger Carex-Puccinien. *Ann. mycol., Berl.*, **28**, 357.

JØRSTAD, I. (1933). A study on Kamtchatka Uredinales. *Norske Videnskaps-Akademi i Oslo.* I Matem-Naturvid. Klasse, No. 9, 1–183.

JØRSTAD, I. (1935). Uredinales and Ustilaginales of Trondelag. *K. norske vidensk. Selsk. Skr.* **38**, 1–90.

SYDOW, P. & SYDOW, H. (1904). *Monographia Uredinearum*, **1**, 671–672, Lipse.

TRANZSCHEL, W. (1933). Uredinalium species novae ex Siberia. *Acta Inst. bot. sci., U.S.S.R.*, Ser II, Fasc. 1, 267–273.

TRANZSCHEL, W. (1939). *Conspectus Uredinalium U.R.S.S.* pp. 426. Leningrad.

URBAN, Z. (1948). *Puccinia tetrensis* n.sp. and other interesting rusts from the High Tatra (Carpathians) with remarks on the geographical distribution of some Geae. *Studia Botanica Cechoslovaca*, **9**, 57–66.

WRIGHT, S. (1931). Evolution in Mendelian populations. *Genetics*, **16**, 97–159.

WRIGHT, S. (1940*a*). The statistical consequences of Mendelian heredity in relation to speciation. *In* J. Huxley (Edit.) *The New Systematics*, pp. 161–183. London.

WRIGHT, S. (1940*b*). Breeding structure of populations in relation to speciation. *Amer. Nat.* **74**, 232–248.

EXPLANATION OF PLATES 4 AND 5

PLATE 4

Fig. 1. *Puccinia clintonii* Peck, from Northern Ireland. Living spores in water. × 1600.

Fig. 2. *P. clintonii* Peck from Northern Ireland. Empty leptospore, and ungerminated spore with pronounced apical cap. × 1600.

Fig. 3. *P. clintonii* Peck from Sierra Madre (*d*). Leptospores bottom left, the others are resting spores. Arrows point to the apparent apiculus on a resting spore, and to a young resting spore not fully pigmented. × 800.

Fig. 4. *P. clintonii* Peck from Idaho (*f*). The arrow points to one of the two leptospores present. × 800.

Fig. 5. *P. clintonii* Peck from Alberta (*b*). Four-celled teleutospore. × 300.

Fig. 6. *P. clintonii* Peck from Oconto (*c*). The striae are not very distinct, and the spores have the characteristic shape of the Oconto material. × 800.

PLATE 5

Fig. 7. *P. lapponica* Rytz from Kiruna, type specimen. Arrow indicates mesospore. × 450.

Fig. 8. *P. pedicularis* Thüm. Monospore, and normal spore showing long collapsed pedicel still adherent to the spore. × 1600.

Fig. 9. *P. clintonii* Peck from Idaho (*f*). Arrow indicates a young spore lacking all pigment but with fully developed striae. × 400.

Fig. 10. *P. lapponica* Rytz, type specimen, three-celled spore. × 450.

Fig. 11. *P. pedicularis* Thüm., from Greenland, showing pedicels and surface texture of spores. × 1600.

(*Accepted for publication 7 May* 1951)

PREDACIOUS FUNGI FROM ROTTEN WOOD

By SYLVIA M. DIXON

Biological Laboratories, The Polytechnic, Regent Street, London

(With 3 Text-figures)

Many fungi are known to occur in rotting wood, preying on the nematodes therein. Two species of *Dactylella*, *D. mammillata* n.sp. and *D. doedycoides*, and two of *Harposporium*, *H. lilliputanum* n.sp. and *H. helicoides*, are recorded here for the first time in Europe.

Dactylella mammillata sp.nov.

Mycelium effusum; hyphis hyalinis, septatis, 1·5–4 μ crassis, ramosis, bullas tenaces subglobosas, 6·5–9 μ crassis, 6·5–7 μ altas, in scapis 5·5–10 μ longis, 2–3·5 μ crassis proferentibus; his bullis vermiculos nematodeos tenentibus; tuber infectionis per integumentum vermiculi intrudentibus e quo hyphae edentes 2·5–5 μ crassae, quae carnem exhaurient excrescunt. Hyphis fertilis, hyalinis, 160–280 μ altis, conidia ellipsoidea, apicea obtusa, 30–60 μ longa, 9–17 μ crassa, plerumque 2-septata, saepe 3-septata, saepissime 4-septata gerentis.

Vermiculos nematodeos capiens consumensque habitat in ligno putrido, prope Eynsham, Oxford, September 1950.

The fungus was obtained from elm wood rotting in a ditch by a roadside near Eynsham, Oxford. Small pieces of the wood were placed on sterile maize-meal agar, and nematode worms soon emerged, together with a dense weft of mycelium of a variety of moulds. After about 3 months, when these fungi had subsided and the agar was beginning to shrink, eelworms were seen to be captured by a species of *Dactylella*. The hyphae were septate, 1·5–4 μ wide, and at intervals bore stalked knobs like those of *D. ellipsospora* (Preuss) Grove. Subtended by unicellular stalks, the knobs were 6·5–9 μ high, and 6·5–7 μ across (Fig. 1 *a*). Eelworms which touched these knobs were held fast by some sticky material, and their attempts to free themselves were of no avail.

When the fungus had secured an eelworm a process grew from the knob through the cuticle and into the body of the worm. An infection bulb developed from this process, and from the bulb, several hyphae, 2·5–5 μ wide, extended into the head and tail of the eelworm. The internal mycelium could be seen clearly when most of the body contents had been absorbed (Fig. 1 *b*).

Hyaline, septate conidia were subsequently observed on the agar around the dead worms. The conidia were borne singly on conidiophores 160–280 μ high, and were produced sparingly. The conidia were ellipsoidal, 30–60 × 9–17 μ, with a blunt apex, and were mostly 5-celled, with a larger central cell (Fig. 1 *c*). Four- and three-celled spores were also seen. In old cultures the conidiophore was sometimes branched, bearing more than one conidium.

Conidia continued to be produced sparsely for about 3 months, in spite of heavy contamination of the plates as well as the inevitable drying of the agar. Isolation of the fungus proved very difficult, because the conidia usually carried with them bacteria and the spores of other fungi. When finally isolated the fungus grew moderately well on maize-meal agar and pea-meal agar, forming very thin white colonies of non-staling type, showing faint zonation. Conidia from pure culture were 29–52 × 10–14·5 μ.

The fungus is placed in the genus *Dactylella* Grove, because the conidia are hyaline and multiseptate, and occur singly. In spore shape it resembles *D. lysipaga* Drechsler, but the latter traps eelworms with non-constricting rings, as well as with knobs, the rings playing a more important part (Drechsler, 1937), and has slightly narrower conidia. The conidia correspond in size with those of *D. ellipsospora* (Preuss) Grove, but differ markedly from the angular spores of this species, in their more rounded outline and blunt tip. The fungus is therefore placed in a new species, the epithet *mammillata* referring to the blunt end of the conidium.

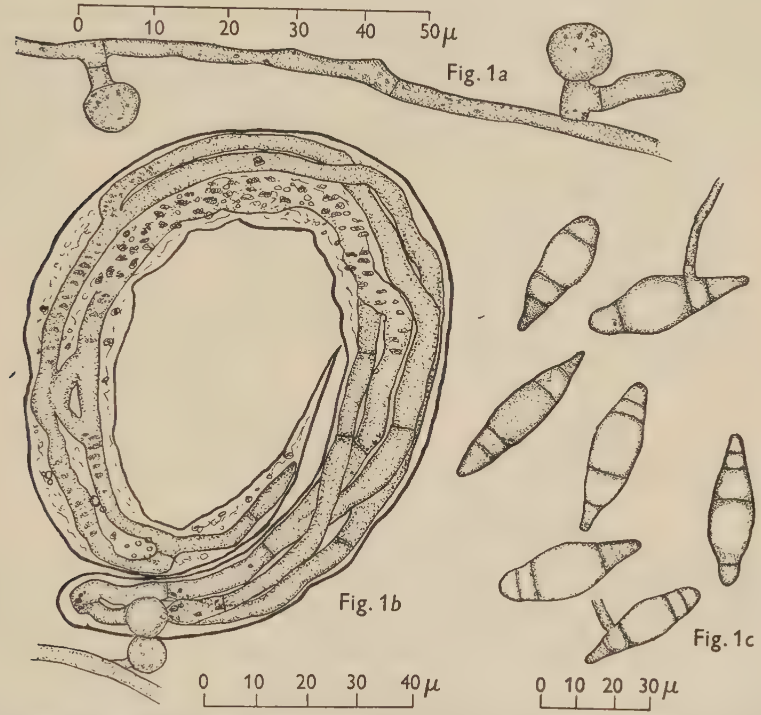


Fig. 1. *Dactylella mammillata* n.sp. *a*, mycelium with stalked knobs; *b*, eelworm captured by a knob and invaded by an infection bulb, from which trophic hyphae have grown out; *c*, conidia.

Type material has been deposited in the Herbarium of the Royal Botanic Gardens, Kew, and in the Herbarium of the Commonwealth Mycological Institute, Kew.

Dactylella doedycoides Drechsler (1940)

Saturated decaying wood, from the edge of an oak-hazel coppice near Rickmansworth, Hertfordshire, yielded the rounded conidia of *Dactylella doedycoides* Drechsler, after about a month on an agar culture. At the same time, constricting rings capturing eelworms were found in the vicinity (Fig. 2*a*, *b*).

Vegetative growth of the mycelium was slow and not extensive, a common feature of Hyphomycetes having this type of trap, but sporulation continued freely for some weeks.

Conidia were 29–40 × 19–23 μ, and agreed with the measurements given by Drechsler (1940). The knob at the tip of the conidiophore, referred to by Drechsler, could not be seen, and thickening was not observed on the inner faces of the rings. Nevertheless, these variations do not seem sufficient to justify erecting a new species for this fungus, it is therefore provisionally named *D. doedycoides* Drechsler, and is recorded here for the first time in Europe.

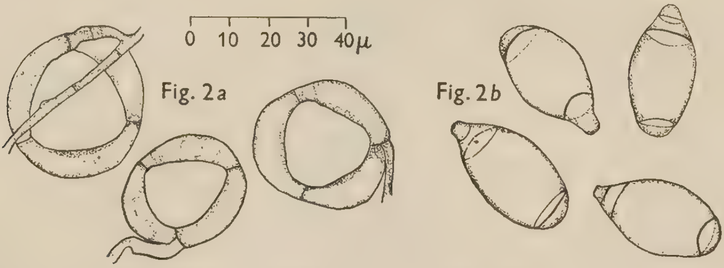


Fig. 2. *Dactylella doedycoides* Drechsler. *a*, constricting rings; *b*, conidia.

Harposporium lilliputanum sp.nov.

Hyphis ramosis, septatis, hyalinis 2–4·5 μ crassis, in corpore vermiculi nematodi. Hyphis fertilis gracilis, procumbentis, ex corpore vermiculi protrudentis, 2–4 μ crassis, tanti 80 μ longis, ramosis subglobosis, 3–5 μ crassis, portatis. Ramoses tanti 8, conidia, aseptata, hyalina, curvata, 4·5–9 μ longa, 1–1·5 μ crassa ferentes. Vermiculos nematodeos consumens, habitat in ligno putrido, prope Eynsham, Oxford, September 1950.

Whilst examining old plates of agar from Eynsham material for *Dactylella mammillata*, several dead eelworms were noticed with fine hyphae extending outwards from them. Closer observation revealed a septate, branched endozoic mycelium, with anastomoses between branches. These internal hyphae had colourless, granular contents, and were 2–4·5 μ in diameter (Fig. 3*a*, *b*).

The delicate hyphae, which were sent out through the cuticle of the nematode and which lay horizontally on the agar to a distance of about 80 μ, bore short fertile branches with spores. Presumably these hyphae were extruded after the death of the host, since they were at right-angles to the cuticle. The fertile branches were subspherical, 3–5 μ in diameter, with a very small distal neck, from which up to eight arcuate conidia, 4·5–9 × 1–1·5 μ, were produced in clusters (Fig. 3*c*–*e*).

Eelworms were not found moving about with spores attached, as observed in other endozoic parasites of this nature, or in the early stages of an attack. Nevertheless, the subspherical fertile branches and the slender curved spores would suggest that the fungus is a species of *Harposporium* Lohde. The only other species with such small spores is *H. diceraeum* (Drechsler, 1941), but they are barbed and shorter. It is therefore proposed to erect a new species, *H. lilliputanum*, the epithet referring to the small conidia.

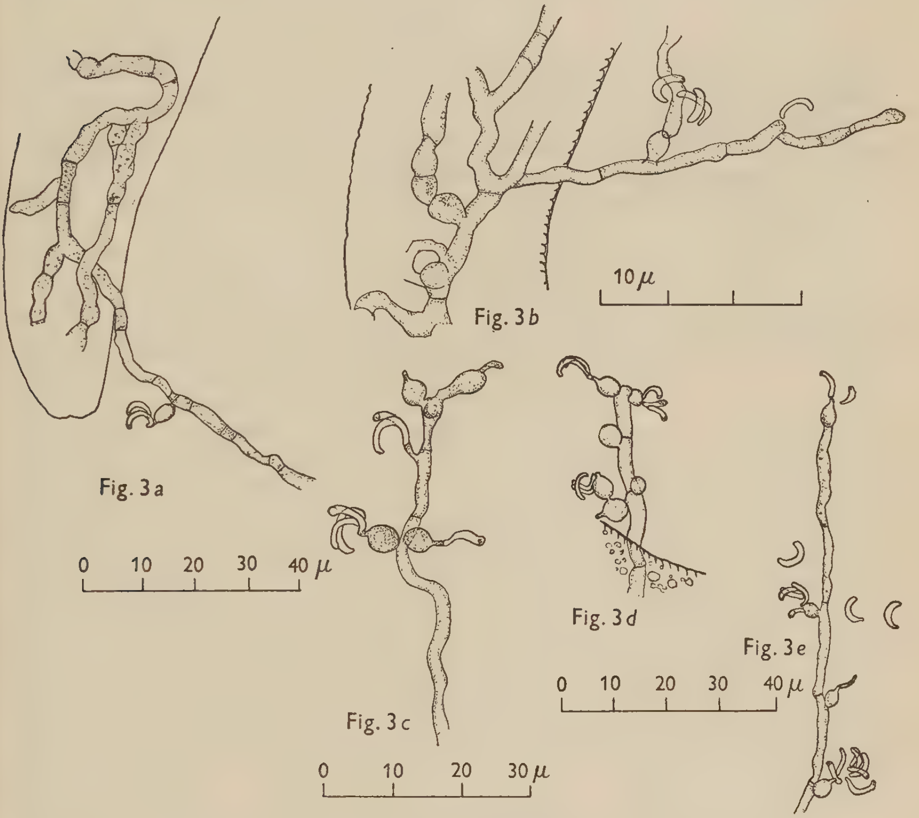


Fig. 3a

Fig. 3b

Fig. 3c

Fig. 3d

Fig. 3e

Fig. 3. *Harposporium lilliputanum* n.sp. *a*, *b*, mycelium within the eelworm; *c–e*, fertile hyphae, bearing conidia.

Type material has been deposited in the Herbarium of the Royal Botanic Gardens, Kew, and in the Herbarium of the Commonwealth Mycological Institute, Kew.

Harposporium helicoides Drechsler (1941)

The rotten base of a *Betula pubescens* stump, from the bank beside Morar Falls, Inverness-shire, provided the material from which *Harposporium helicoides* is reported. The fungus was seen extending from dead eelworms, about 10 weeks after inoculation of sterile agar with small pieces of the wood. Closer examination of the fertile hyphae showed the characteristically curved spores described by Drechsler (1941). Camera lucida measurements of the conidia ($20–45 \times 0{\cdot}5–1{\cdot}5\,\mu$) showed good agreement with Drechsler's.

All measurements and drawings were made from fresh, living material.

I should like to express my gratitude and appreciation to Dr C. L. Duddington for his invaluable assistance throughout the work.

REFERENCES

Drechsler, C. (1937). Some hyphomycetes that prey on free-living terricolous nematodes. *Mycologia*, **29**, 499–503.

Drechsler, C. (1940). Three new hyphomycetes preying on terricolous nematodes. *Mycologia*, **32**, 448–456.

Drechsler, C. (1941). Some hyphomycetes parasitic on free-living terricolous nematodes. *Phytopathology*, **31**, 794–795 and 797–800.

Lohde, G. (1874). Einige neue parasitische Pilze. *Tageblatt der* 47. *Versammlung deutscher Naturforscher und Ärzte in Breslau*, pp. 203–206.

(*Accepted for publication* 17 *July* 1951)

MASONIA, A NEW GENUS OF HYPHOMYCETES

By GEORGE SMITH

London School of Hygiene and Tropical Medicine

(With Plate 6)

A new genus of Hyphomycetes is described for which the name *Masonia* is proposed. The genus is erected on two species, *M. grisea*, type of the genus, found as a culture contaminant, and *M. chartarum*, occurring on wall-paper in a London house.

Masonia gen.nov.

Coloniis semper multo restrictis, griseis vel fuscis, subvelutinis; hyphis fertilibus repentibus, simplicibus vel funiculosis, subdematiaceis, phialides in totis partibus irregulariter ferentibus; phialidibus sessilibus vel paucis in stipitibus brevissimis dispositis, brevibus, mediis inflatis et apicibus angustis; conidiis in catenis longis, continuis, fuscis, subglobosis ovatis pyriformibusve, glabris vel spinulosis.

Species typica *Masonia grisea*.

Etym. ab E. W. Mason, propter accessiones insignes ad scientiam Hyphomycetum.

Colonies are slow-growing on all laboratory culture media, dark coloured, usually ashy or brownish grey, almost velvety but with trailing fertile hyphae or ropes of hyphae; vegetative hyphae dematiaceous; fertile hyphae varying in colour from very pale brown to greyish brown, sometimes studded with dark granules, and bearing phialides irregularly along the whole length; phialides solitary and sessile or in small irregular groups on very short stalks, short, swollen in the middle and tapering abruptly to very narrow tips; conidia dry, borne in long chains, dark-coloured, subglobose ovate or somewhat pyriform, smooth or finely spinulose.

Type species *Masonia grisea* n.sp. Genus named after E. W. Mason, in appreciation of his distinguished contributions to our knowledge of the Hyphomycetes.

Masonia grisea sp.nov.

Coloniis in agaris omnibus similibus, lente crescentibus, atro-griseis, paene velutinis, reverso, sed non agaro, nigro, opalescente; hyphis aetheriis leviter coloratis, 1·5 μ diam.; phialidibus sessilibus et solitariis vel 2–4 in stipitibus brevibus, 4 × 2·6–3 μ; conidiis dematiaceis, subglobosis vel pyriformibus, glabris, 4–5 × 2·7–4 μ, in catenis longis.

Contaminatione in laboratorio, L.S.H.T.M.

Colonies on most laboratory media similar, slow-growing, with a thin blackish stromatic layer covered with dark grey almost velvety aerial mycelium, occasionally forming small tufts of whitish mycelium in old cultures; reverse, but not the agar, almost black, opalescent; aerial hyphae trailing, sometimes slightly ropy, very pale brown, bearing phialides irregularly along the whole length; phialides sessile and solitary, or in irregular groups of two to four on short pedicels, swollen in the middle and narrowing abruptly at the apex, 4 × 2·6–3 μ; conidia abstricted in basipetal succession, dark brown, subglobose or more or less pyriform, smooth or very nearly so, 4–5 × 2·7–4 μ, forming long chains.

Masonia chartarum sp.nov.

Coloniis in agaro Czapekii lentissime crescentibus, griseis, corrugosis; in farina *Zeae maydis* cum agaro lente crescentibus, tenuissimis, conidia tarde gerentibus, reverso nigrescente; in carota disintegrata vel decocto tuberorum cum agaro celerius sed tamen lente crescentibus, atro-griseis, rugosis, pulverulis, reverso atro-griseo opalescente; hyphis aetheriis repentibus, funiculosis, glabris vel cum granis nigris asperulis, 1·2–1·7 μ diam.; phialidibus semper solitariis, sessilibus, baso et apice constrictis, medio inflato, 5–8 × 2–2·5 μ; conidiis ovatis vel saepe apiculatis, fuscis, spinulosis, 4–5 × 2·8–3·5 μ, in catenis longis.

Habitat in charta murale, Londinii.

Masonia chartarum, unlike *M. grisea*, produces colonies on different culture media which vary considerably in appearance. On Czapek agar growth is very slow, with colonies grey, heaped and corrugated, and reverse dirty grey; on corn meal agar a very thin blackish colony is formed, with black reverse and with tardy production of conidia; on disintegrated whole carrot plus agar, or potato agar, growth is somewhat more rapid but still slow, with colonies grey, convoluted, powdery, and reverse dark grey and opalescent. Fertile hyphae simple or in ropes, always close to the substrate, smooth or roughened with dark granules which tend to be detached in fluid mounts, 1·2–1·7 μ diameter; phialides borne all over the aerial hyphae, sessile and never in groups, varying in shape but usually narrow at the base, then broadening out to about twice the diameter, and terminating in a narrow conidium-bearing apex, 5–8 × 2·5 μ; conidia irregularly ovate, often apiculate at one or both ends, finely spinulose, brown, 4–5 × 2·8–3·5 μ.

The type species, *M. grisea*, is known only as a single isolate, found in 1946 as an aerial contaminant of a Petri dish. In spite of fairly extensive search it has not been found again but, in 1950, a similar species, described here as *M. chartarum*, was isolated from a sample of mouldy wall-paper, on which it was the dominant infection. The paper was taken by Dr K. Maunsell, of the Institute of Laryngology and Otology, from a damp wall in a house occupied by an asthmatic. Tests carried out by Dr Maunsell have shown that the patient is insensitive to extracts of *M. chartarum* and also to a variety of other common moulds, but that three other subjects who are allergic to *Cladosporium herbarum* and to a number of species of *Penicillium* and *Aspergillus* are also sensitive to *Masonia chartarum*. It is of interest that a sample of mouldy wall-paper from the other side of the party wall on which *M. chartarum* was growing, that is from the house next door, showed no sign of infection with this species but was covered with a variety of species of *Aspergillus* and *Penicillium*.

I have been unable to find a description of any genus to which the two species can be referred. Genera of moulds which produce sessile phialides laterally from all parts of the aerial mycelium are few in number. They include *Scopulariopsis*, *Paecilomyces*, *Cephalosporium*, *Gliomastix* and *Cadophora*, all of which differ substantially from the moulds here described. *Scopulariopsis* has almost cylindrical phialides, usually produces some typically

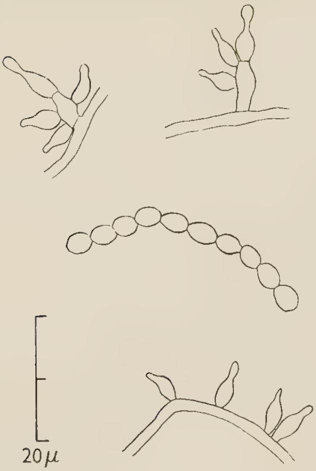


Fig. 1.

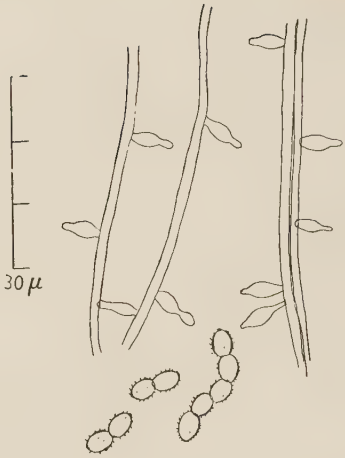


Fig. 2.

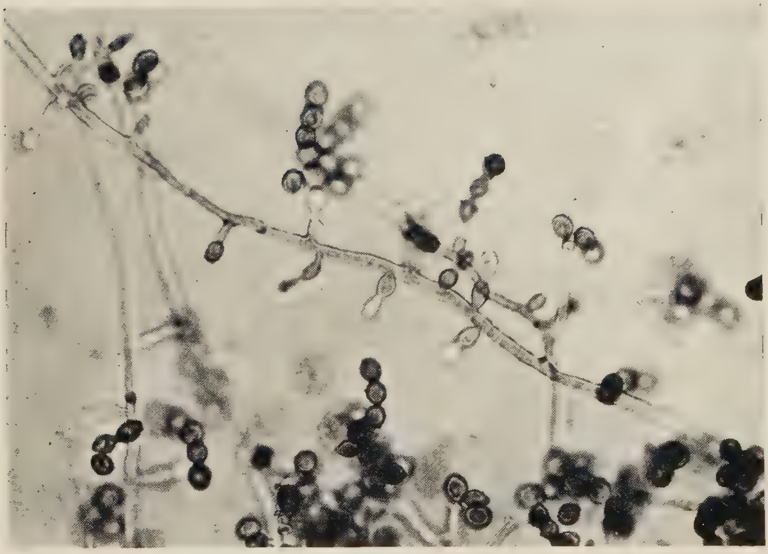


Fig. 3.

penicillate fructifications, has very characteristic conidia with basal ring and pore, and is pale coloured. Species of *Paecilomyces* produce numerous solitary phialides on trailing hyphae, but usually form, in addition, penicillate fruiting structures; the phialides are very characteristic, quite unlike those of *Masonia*, and both hyphae and spores are pale coloured. *Cephalosporium* is also pale coloured, forms long subulate phialides, and produces its conidia in mucilaginous balls. *Gliomastix* is dematiaceous but has phialides like those of *Cephalosporium* and produces spore balls, at least in young cultures. A number of species of *Cadophora*, described by Melin & Nannfeldt (1934), bear some superficial resemblance to *Masonia*. In these, however, the phialides show very distinct collarettes, revealing clearly the endogenous origin of the conidia. In addition, the conidia are, except in one species, hyaline and bacillar, and form balls on the tips of the phialides.

Cultures of *Masonia grisea* and *M. chartarum* are maintained in the L.S.H.T.M. collection and will be distributed to the Centraalbureau voor Schimmelcultures, Baarn, and to the Commonwealth Mycological Institute, Kew. Dried mature cultures of *Masonia grisea* and *M. chartarum* on potato dextrose agar, deposited in the Herbarium of the Royal Botanic Gardens, Kew, are designated as the types. The dried culture of *M. grisea* is designated as the type of the genus *Masonia*.

REFERENCE

Melin, E. & Nannfeldt, J. A. (1934). Researches into the blueing of ground woodpulp. *Svenska SkogsvFören. Tidskr.* 1934, (iii–iv), 397–616.

EXPLANATION OF PLATE 6

Fig. 1. *Masonia grisea* n.sp. Phialides and spores.

Fig. 2. *M. chartarum* n.sp. Portions of conidiophores and spores.

Fig. 3. *M. chartarum* n.sp. Portions of conidiophores and spores. × 800.

(*Accepted for publication* 28 *September* 1951)

TRICHOCLADIUM HARZ

By S. J. HUGHES

Commonwealth Mycological Institute, Kew, Surrey

(With 4 Text-figures)

The lectotype species of *Trichocladium* Harz, *T. asperum* Harz, is illustrated and described. *Sporidesmium opacum* Corda is considered to be congeneric with *Trichocladium asperum* and the new combination is proposed. Corda's fungus is redescribed and illustrated.

In 1871 Harz published the generic name *Trichocladium* for three species:

(i) '*T. asperum* n.sp. [syn.] *Sporidesmium asperum* Crd (?)'

This was found on damp, dead wood of *Fagus sylvatica* in Berlin and of *Quercus* in Vienna; it was well described and figured and has subsequently been recognized by a number of authors.

(ii) '*T. tenellum* n.sp.'

This was described, figured and stated to be a delicate fungus parasitizing *Stilbum vulgare* and *S. rigidum* in Vienna. It was not compiled in Saccardo's *Sylloge Fungorum* and, as far as I know, has not been recognized since.

(iii) '*T. fuscum* m[ihi]. syn. *Diplosporium fuscum* Hallier Pflanzenvz. 1866'

This was not compiled in Saccardo's *Sylloge Fungorum*; I have not succeeded in tracing the origin of *D. fuscum.*

Harz did not designate the type species of the genus, so for the purpose of writing this paper and reclassifying another fungus into this genus, *Trichocladium asperum* Harz is chosen as lectotype.

Since 1871 one species and one variety have been described in *Trichocladium.*

(iv) *T. asperum* var. *charticola* Sacc.

Saccardo (1886) based this variety on a collection, on wet blotting-paper, made in Germany by Magnus; he described the conidiophores as very frequently branched and the conidia as 20 by 10 μ. It was figured (as *T. asperum*) in *Fungi italici* 952, and is certainly reminiscent of Harz's fungus. In 1901 Saccardo listed the fungus as '*Trichocladium charticola* Sacc. = *Trichocladium asperum* Harz, var. [*charticola* Sacc., in *Sylloge Fungorum*,] IV, 376, [1886]' which may be regarded either as a new combination *T. charticola* [(Sacc.)] Sacc. or as a new species name *T. charticola* Sacc. to replace the variety on which it is based.

(v) *T. olivaceum* Petch

Petch (1922) described his new species on decaying leaves of *Furcraea gigantea* (Amaryllidaceae) from Ceylon. Part of the type collection (Petch No. 5626) preserved in Herb. R.B.G. Kew has been examined and is considered to be based on *Torula diversa* Cooke (1878) which was described from Georgia, United States, on leaves of *Agave* (Amaryllidaceae) (Hughes, 1952).

(1) **Trichocladium asperum** Harz

Six collections or isolations are assigned to this name in Herb. I.M.I., and the description that follows is based upon them. The fungus is illustrated in Fig. 1.

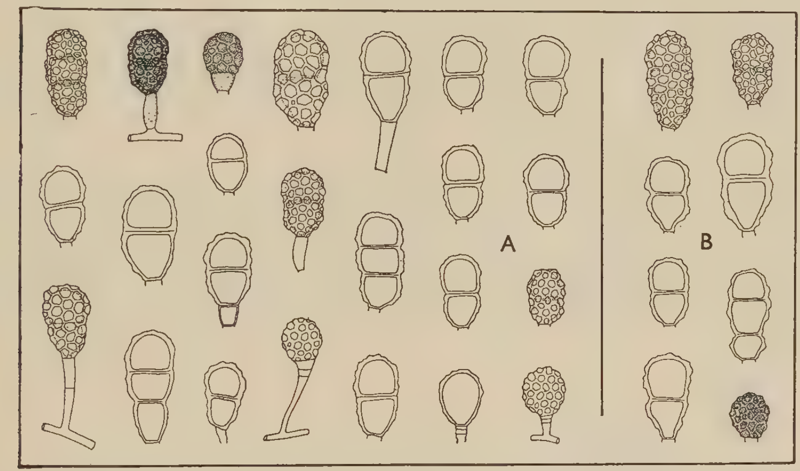


Fig. 1. *Trichocladium asperum*. A, mycelium, conidiophores, and conidia from a 12-day-old culture of Herb. I.M.I. 39677 on potato-carrot agar; B, conidia from Herb. I.M.I. 31252; all ×500.

Description of Trichocladium asperum

Colonies effuse, cottony, at first white, later grey.

Mycelium composed of hyaline to subhyaline, septate, branched hyphae 1–2·5 μ wide.

Conidiophores poorly differentiated, 1- to 4-celled, up to 25 μ long, 1·5–3·5 μ wide, rarely forked, hyaline to subhyaline, arising as lateral branches of mycelial hyphae.

Conidia develop singly as the blown-out end of conidiophores. At maturity they are 1- to 3-(mostly 2-)celled, slightly constricted at the septa, subglobose to oval or cylindric-oval, rounded at the apex, flattened at the basal scar which usually bears a small frill, thick-walled, coarsely warted with large, angular warts, dark brown, measuring 12–17 by 10–12 μ (1-celled), 16–25 by 10–15 μ (2-celled) and 23–28 by 11–14 μ (3-celled). Occasionally the basal cell of a conidium is narrowly truncate or cylindrical, smooth and pale brown, but generally the conidia are 2-celled with the component cells dark brown, warted and equal.

T. asperum grows well in culture on various media; on malt agar vast numbers of conidia are produced whilst on potato-carrot agar fewer conidia develop but their development is more readily followed.

Collections maintained as Trichocladium asperum *in Herb. I.M.I.*

Contaminant of culture, England (P.K.C.A.) [39677].* On *Pinus sylvestris* needles, England [31252]. Isolation from soil, Canada (G.R.B.) [34446]. Isolation from *Solanum tuberosum* tubers, Mauritius (E.F.S.) [34447]. Isolations: (S.P.W.) [24943], and (Berkhout) [34646].

British records of Trichocladium asperum

Massee and Salmon (1902) recorded the fungus on 'rabbit-dung, Kew, Jan. 1901'; I have not seen this collection.

A. L. Smith (1903) recorded the fungus 'on a laboratory culture of a lily root, Norwood'. In Herb. Brit. Mus. (Nat. Hist.) a slide labelled '*T. asperum* Harz, on a *Pythium* culture from Hyacinth root, Norwood, Dec. 1902; A.L.S.' is preserved; this probably is the basis for the 1903 record and it bears *T. asperum*.

Thaysen and Bunker (1927) compiled '*Dicoccum asperum*, Corda' with a description and cited *Sporidesmium asperum* Corda and *Trichocladium asperum* Harz as synonyms. The combination *Dicoccum asperum* (Corda) was made by Lindau in 1907 and *Trichocladium asperum* Harz was cited as a synonym; Mason (1933) has discussed this matter. Thaysen and Bunker's description is somewhat similar to that given above; I have not seen a collection.

(2) **Trichocladium opacum** (Corda) Hughes comb.nov.

≡*Sporidesmium opacum* Corda in *Icones fungorum*, **1**, 7, 1837.
≡*Xenodochus opacus* (Corda) Bonorden in *Handbuch der allgemeinen Mykologie*, p. 49, 1851.
≡*Clasterosporium opacum* (Corda) Saccardo in *Sylloge Fungorum*, **4**, 387, 1886.

Corda (loc. cit. supra) described his species as follows: 'subeffusum irregulare, aterrimum opacum; sporis brevissime pedicellatis, polymorphis, oblongis, cuneatis, ovatis, vel ellipticis, bi-tri- vel tetradymis, primum fuscis pellucidis, dein atris, opacis; pedicello albido, grumulis luteis immerso. Longit spor. 0,0005–0,00150. p.p.[14–42 μ]. Habit. in ligno sicco, prope Reichenberg.' Corda's original illustration is reproduced as Fig. 2.

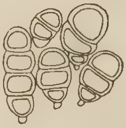


Fig. 2. *Trichocladium opacum.* Reproduction of part of Corda's (1837) figure, slightly reduced.

The redescription of *T. opacum* given below is based upon seven collections or isolations preserved in Herb. I.M.I. and preparations made from five collections preserved in Herb. W.B. Grove in The University, Birmingham. These collections are listed below.

---

* All numbers of specimens cited in brackets [ ] are accession numbers in Herb. I.M.I.

Description of Trichocladium opacum (Fig. 3)

Colonies effuse, black, sometimes shining.

Mycelium immersed and superficial, composed of hyaline to pale brown, branched, septate hyphae 2–4 μ wide.

Conidiophores absent or present but poorly differentiated, scattered or crowded, 1- to 3-celled, up to 12 μ long, rarely forked, subhyaline to pale brown, arising as lateral branches of mycelial hyphae.

Conidia develop singly as the blown-out end of conidiophores; alternately a hyphal cell may expand into a conidium. At maturity they are smooth, irregularly oval, ellipsoid or clavate, usually straight, sometimes bent, 1- to 5-celled with the basal cell usually pale brown and the others very dark brown to almost black and thick-walled; they are slightly or not at all constricted at the septa and measure 20–40 by 10·5–16 (mostly 25–35 by 12–14) μ.

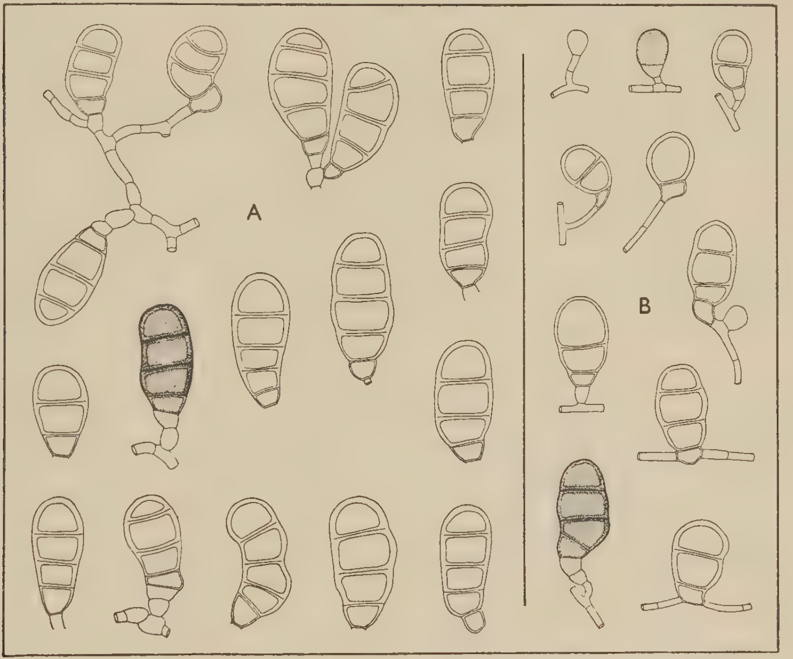


Fig. 3. *Trichocladium opacum.* Mycelium, conidiophores, and conidia from Herb. I.M.I. 29394 (*a*); A, from wood of *Fagus sylvatica*; B, from a 3-week-old culture on potato-dextrose agar; all × 500.

Habitat: on the rotten wood of *Fagus sylvatica* and *Quercus* (British oak) and on a dead herbaceous stem (?*Filipendula*). It has also been isolated from soil.

Trichocladium opacum *in culture*

The fungus can grow exceedingly well in culture, and on a suitable medium produces abundant conidia which differ little from those found in nature. Two isolations have been studied, Herb. I.M.I. 10970 which arose as a contaminant, and Herb. I.M.I. 29394(*a*) which was a culture started from conidia growing on wood of *Fagus sylvatica.*

After 5 weeks on Quaker-oat agar much aerial mycelium had been produced but only a few conidia. On potato-dextrose agar a 5-week-old culture had produced a little aerial mycelium which bore abundant conidia so that the agar plate appeared quite black. A 5-week-old culture on malt agar was, in its performance, intermediate between that on Quaker-oat and potato-dextrose agars.

Collections maintained as Trichocladium opacum *in Herb. I.M.I.*

(*a*) *Herb. I.M.I. collections.* On wood of *Fagus sylvatica*, *Quercus* (British oak) and unidentified wood, England (S.J.H.) [29394*a*, 33720, 20032*b*, 8131*b*]. Contaminant of culture, England [19070]. Isolation from soil, Canada (G.R.B.) [1246].

(*b*) *W. B. Grove's collections.* '*Sporodesmium opacum*, on dead dry wood, Sutton (D.L.), 3. ix. 1883 [scripsit Grove]' [slide 18116]. '*Sporodesmium opacum*, on a dead stump, Bradnock's Marsh, 28. vii. 1884 [scripsit Grove]' [slide 18117]. '*Sporodesmium opacum*, Ca, dead wood, Streetly, 24. x. 1885 [scripsit Grove]' [slide 18118]. '*Sporodesmium opacum*, Ca, (or ?*pyriforme*), on dead herbaceous stem (?*Spiraea*), Sutton D.L., 6. ii. 1886 [scripsit Grove]' [slide 18119]. '*Clasterosporium opacum* Sacc., = *Sporodesm. opacum*, Ca, Shustoke, 15. v. 1886 [scripsit Grove]' [slide 18115].

As far as I am aware Grove did not record any of these collections.

British records of Sporidesmium opacum

Berkeley and Broome (1866) recorded this 'on stumps of wych elm, near St Catherines, March 31, 1865, C. E. Broome. When young, forming small, round, cinereous tufts, sparingly scattered over the wood. This has been received from Mr Bloxam under the name of *S. fasciculatum*; but it does not agree with Corda's character, "soris effusis".'

Cooke (1871) compiled Berkeley and Broome's record.

Massee (1893) compiled the fungus as *Clasterosporium opacum.*

Adams and Pethybridge (1910) recorded *C. opacum* in their catalogue of Irish fungi.

Crossland (1913) recorded *C. opacum* on decaying wood.

I have not traced any of these collections in Herb. R.B.G. Kew or Herb. Brit. Mus. (Nat. Hist.). The 'small, round, cinereous tufts' of Berkeley and Broome's record of this fungus seems quite wrong for Corda's diagnosis.

British records of Clasterosporium claviforme *var.* leptopus

Saccardo described his variety in 1886 (p. 391) from a collection on rotten wood of *Ficus carica*, North Italy. It was figured in *Fungi italici*, Fig. 749 (sub *Clasterosporium claviforme* (Preuss) Sacc.) which is reproduced as Fig. 4.

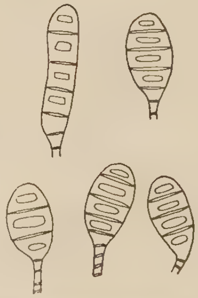


Fig. 4. *Clasterosporium claviforme* var. *leptopus*. Reproduction of Saccardo's *Fungi italici* 749 sub *Clasterosporium claviforme* (Preuss) Sacc., slightly reduced.

Cooke (1888) recorded this variety 'on naked wood, Weybridge', and this collection is preserved in Herb. R.B.G. Kew. The fungus on it is identical with that described above as *Trichocladium opacum*. From the figure it seems doubtful to me whether Saccardo's variety and *T. opacum* are identical.

Massee (1893) compiled Cooke's record.

A Canadian record of Torula allii

Bisby, Buller, Dearness, Fraser and Russell (1938) recorded the isolation of *T. alii* Harz from soil, Manitoba. This record is based upon Herb. I.M.I. 1246 which is currently disposed as *Trichocladium opacum*.

CONCLUSION

As delimited here, *Trichocladium* is characterized by short, poorly differentiated conidiophores which swell out at the apex into a solitary, dark brown, thick-walled, more or less oval conidium which is transversely 1- to 4-septate.

REFERENCES

ADAMS, J. & PETHYBRIDGE, G. H. (1910). A census catalogue of Irish fungi. *Proc. R. Irish Acad.* **28**, 149.

BERKELEY, M. J. & BROOME, C. E. (1866). Notices of British fungi (no. 1145). *Ann. Mag. nat. Hist.*, Ser. 3, **18**, 121.

BISBY, G. R., BULLER, A. H. R., DEARNESS, J., FRASER, W. P. & RUSSELL, R. C. (1938). *The Fungi of Manitoba and Saskatchewan*, p. 127. Ottawa.

COOKE, M. C. (1871). *Handbook of British Fungi*. London.

COOKE, M. C. (1878). Ravenel's American fungi. *Grevillea*, **7**, 33.

COOKE, M. C. (1888). British Hyphomycetes. *Grevillea*, **16**, 107.

CROSSLAND, C. (1913). Mycological meeting at Sandsend. *Naturalist, Lond.*, p. 28.

HARZ, C. O. (1871). Einige neue Hyphomyceten. *Bull. Soc. imp. Moscow*, **44**, 125–127.

HUGHES, S. J. (1952). *Sirodesmium granulosum* and *Torula diversa*. *Naturalist, Lond.* (in the press).

LINDAU, G. (1907). In Rabenhorst, *Kryptogamen-Flora*, 2 Aufl., I (Pilze), **8**, 764.

MASON, E. W. (1933). *Annotated Account of Fungi received at the Imperial Mycological Institute*, List II, fasc. 2, p. 59.

MASSEE, G. (1893). *British Fungus Flora*, **3**. London.

MASSEE, G. & SALMON, E. S. (1902). Researches on coprophilous fungi. *Ann. Bot., Lond.*, **16**, 85.

PETCH, T. (1922). Additions to Ceylon fungi. II. *Ann. R. bot. Gdns Peradeniya*, **7**, 318.

SACCARDO, P. A. (1886). *Sylloge Fungorum*, **4**, 376.

SACCARDO, P. A. (1901). *Sylloge Fungorum*, **15**, 424.

SMITH, A. L. (1903). New or critical microfungi. *J. Bot., Lond.*, **41**, 259.

THAYSEN, A. C. & BUNKER, H. J. (1927). *The Microbiology of Cellulose, Hemicelluloses, Pectin and Gums*, p. 150. London.

(*Accepted for publication* 8 *November* 1951)

ON SOME HYPHOMYCETE SPORES, INCLUDING THOSE OF *TETRACLADIUM MAXILLIFORMIS*, FROM WHEATFEN

By C. T. INGOLD, *University of London, Birkbeck College*,
AND E. A. ELLIS, *Castle Museum, Norwich*

(With 2 Text-figures)

An account is given of a collection of peculiar spores from the scum on water in a ditch. A number appear to belong to undescribed species. However, many spores of *Tetracladium maxilliformis* (Rost.) Ing. were present. These are described and compared with those of *T. setigerum* (Grove) Ing.

In December 1950 one of us (E.A.E.) encountered a collection of fungus spores in the scum on the surface of a fresh-water tidal ditch bordering a wood at Wheatfen Broad near Norwich. Some could be readily identified, those of *Alatospora acuminata* Ing. and *Tetracladium setigerum* (Grove) Ing. being especially abundant, whilst the spores of others (e.g. *T. marchalianum* de Wild., *Tricladium angulatum* Ing., *T. splendens* Ing. and *Anguillospora longissima* Ing.) were much less common. There were also a few spores (Fig. 1 *a*) of the predacious phycomycete *Acaulopage tetraceros* Drechsler, a fungus showing in the form of its spore a remarkable parallelism with *Clavariopsis aquatica* de Wild. and *Heliscus longibrachiatus* Ing. Again there were a few spores (Fig. 1 *b*) agreeing moderately well with those of *Titaea ornithomorpha* Trotter, which, incidentally, is clearly not a *Titaea*. In addition, there were a number of spores of somewhat striking form which could not be identified. A 4-radiate specimen of one type (Fig. 1 *c*) has already been figured (Ingold, 1942) from scum on a Leicestershire stream, but 5-radiate specimens are more usual. This type has also been seen from time to time in scum from a stream at Sevenoaks, Kent. Particularly striking and abundant were peculiar shrimp-like spores (Fig. 1 *d*) and a curious type (Fig. 1 *e*) where the spore consisted of a monochasial cyme of from two to five segments. Another common type (Fig. 1 *f*) consisted of a plate of four cells, three of them prolonged into spines, and the whole looking like a species of the alga *Pediastrum* but colourless. A common and very asymmetrical spore (Fig. 1 *g*) consisted of two sections, one narrowly elliptical and the other somewhat triangular, linked by a narrow isthmus and with longish spines on four of its five projections. The single, spineless projection, one of the two ends of the elliptical part, was always somewhat flattened and clearly represented the point of attachment to the parent structure. A few fan-like spores (Fig. 1 *h*) were also seen. This type of spore was non-septate and consisted of a main axis giving off near its base a pair of opposite laterals; each of these produced one basal secondary branch which usually branched again in the same manner. The result of the branching was a spore with usually seven long straight hyphae spread out more or less in one plane.

Of special interest was the occurrence in considerable abundance of spores of *Tetracladium maxilliformis* (Rost.) Ing.

Ingold (1942) recognized three species of *Tetracladium* and two of these (*T. marchalianum* and *T. setigerum*) were redescribed from living material. *T. marchalianum* is extremely abundant and is to be found on decaying leaves of woody plants from almost any stream, but *T. setigerum*, though common, is not quite so abundant. Hundreds of collections of these species from many localities have been examined and both are very constant in their characters. The third species, *T. maxilliformis*, was described by Rostrup (1894) as *Titaea maxilliformis*. He found it on stalks of *Trifolium pratense* already attacked by *Typhula trifolii*. His brief account included a figure showing three isolated spores.

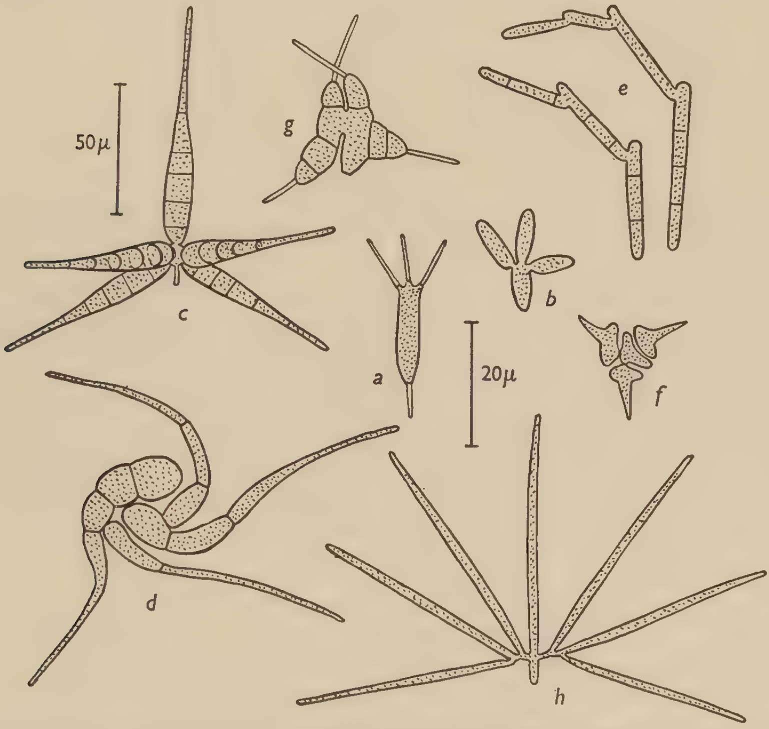


Fig. 1. Spores from ditch scum. *a*, *Acaulopage tetraceros*; *b*, *?Titaea ornithomorpha*; *c–h*, spores of unknown species. All drawn to same scale except *c*, which is less magnified.

Little has been recorded of *Tetracladium maxilliformis* since its original discovery. However, the Centraalbureau voor Schimmelcultures, Baarn, lists a culture of *Titaea maxilliformis* Rost. which was isolated by Miss Bouwens in May 1936 from roots of *Pachysandra terminalis*. There is now no information concerning the sporulation of this fungus when first isolated, but if the isolate ever did produce spores, its capacity to do so seems now to have been lost. Further, no material was deposited in any herbarium. It is not now possible to be quite sure if the fungus isolated was Rostrup's species. It might well have been *Tetracladium setigerum*, since for anyone who has not seen both species, confusion would be very easy. Confusion with *T. marchalianum* would hardly be possible, but at first sight spores of *T. setigerum* and *T. maxilliformis* are much alike. There are, however, a number of characters that serve to distinguish *T. maxilliformis*, namely: (1) the *b* arm of the spore (Fig. 2 and Ingold, 1942, p. 371) is short and blunt, not relatively long and pointed; (2) the *d* or fourth arm is normally absent; (3) there are usually only two finger-like processes (*e* and *f*), and if a third is developed it does not arise as a branch from *e* as does the third process in *T. setigerum*; (4) the arms *a* and *c* taper rather gradually and may be elegantly recurved; (5) the finger-like processes tend to be narrower than in *T. setigerum*; and (6) the whole spore tends to be smaller.

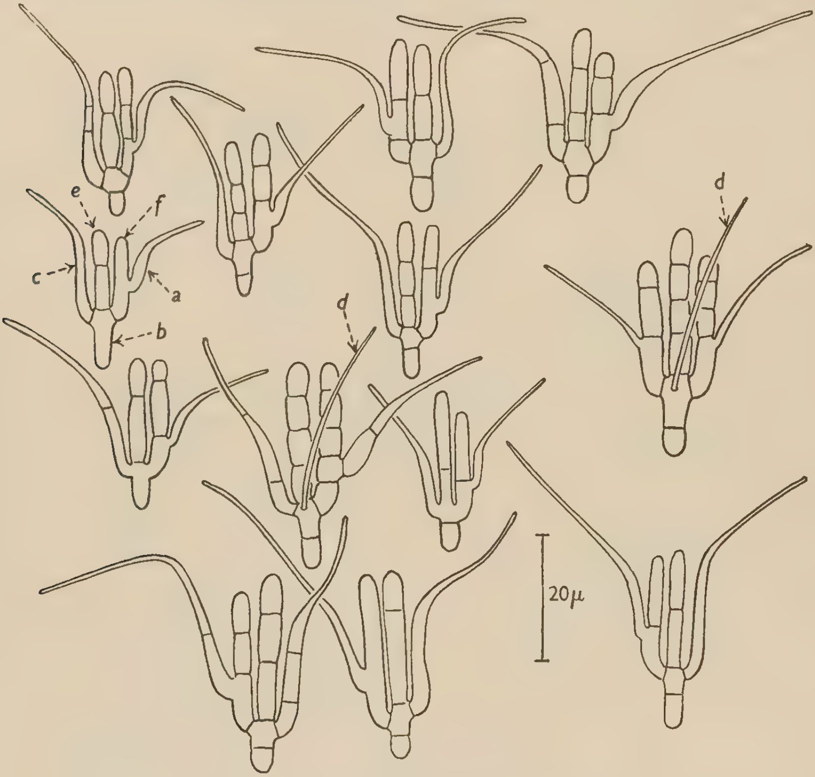


Fig. 2. Spores of *Tetracladium maxilliformis*.

Attempts were made to isolate *T. maxilliformis* and the other fungi with curious spores, but these failed, apparently because of the great abundance of bacteria in the scum. These fungi have been searched for on various organic substrata from the tidal ditch. Submerged decaying leaves of woody species and of reed-swamp plants and also submerged twigs have been examined, but so far without finding these fungi. The account is published in the hope that others may be on the look-out for them.

REFERENCE

INGOLD, C. T. (1942). Aquatic Hyphomycetes of decaying alder leaves. *Trans. Brit. mycol. Soc.* **25**, 339–417.

(*Accepted for publication* 23 *October* 1951)

FIFTY-YEAR INDEX TO THE *TRANSACTIONS*

On 1 January 1952 a Fifty-year Index to the Society's *Transactions* compiled by Dr G. R. Bisby, was published by the Cambridge University Press. This work, in addition to a list of titles of all the papers in the first thirty volumes of the *Transactions* (1898–1948) arranged under authors' names and a general index to genera and species, includes the dates of publication of the eighty-nine separate parts, lists of the Spring and Autumn Forays, and a host index. Price: 21 shillings. Postage 6*d*.

PROCEEDINGS, 1951

MEETINGS

Meeting held in the Department of Biology, Chelsea Polytechnic, London, S.W. 3, at 11.0 a.m., 20 January 1951. The President, Dr P. H. Gregory, in the Chair.

J. A. TOMLINSON. Brown Core of Polyanthus and Primula.
Miss G. M. WATERHOUSE. Is there heterothallism in the genus *Phytophthora*?
Miss U. MITTWOCH. Studies on wild type and mutant strains of *Coprinus lagopus*.
S. WALLER. A new disease of Sycamore.
Miss M. ROBERTS. A *Micromycopsis* on Oedogonium.
C. T. INGOLD. The spores of *Tetracladium maxilliformis* and other curious Hyphomycete conidia.

Meeting held in the rooms of the Linnean Society of London, Burlington House, Piccadilly, W. 1, at 11.0 a.m., 9 March 1951. The President, Dr P. H. Gregory, in the Chair.

Miss E. M. WAKEFIELD. Mushrooms, wild and cultivated.
R. L. EDWARDS. Mushroom growing and mushroom composts.
I. F. STOREY. The effect of environmental conditions on the production of mushrooms.
H. H. GLASSCOCK. Diseases and competitors of the cultivated mushroom.
Miss C. W. H. DUNCAN. Experimental approach to the problem of Truffle.

Meeting held at the University of Bristol, at 10.0 a.m., 14 July 1951. The President, Dr P. H. Gregory, in the Chair.

Miss L. E. HAWKER and Miss J. FRAYMOUTH. The nature of the endophytes in the root nodules of some non-leguminous plants.
Miss V. O. NICHOLLS. Fungi invading the roots of some members of the Lilliflorae, with special reference to host-parasite relationships.
Miss B. M. TOWNSEND. Morphology and physiology of rhizomorphs and sclerotia of some plant pathogenic fungi.
Miss V. M. WEHRLE and L. OGILVIE. Investigation on Take-all of wheat in the South-Western Province.

Demonstrations

Root nodules of non-leguminous plants.
Fungi invading the roots of members of the Lilliflorae.
Rhizomorphs and sclerotia of some plant pathogenic fungi.
Wilt disease of *Dimorphotheca*.
Haustoria of the Peronosporales.
Studies in nitrification in enriched soil by the percolation technique.

Meeting held at the Imperial College of Science and Technology, South Kensington, London, S.W. 7, at 10.30 a.m., 19 October 1951. Dr S. D. Garrett in the Chair at the morning session; the President in the Chair at the afternoon session.

EPIDEMIOLOGY OF AIR-BORNE FUNGUS DISEASES

E. C. LARGE. Introduction.
L. P. SMITH. The Agricultural Meteorological Service.
P. H. GREGORY. Spore dispersal.
C. C. V. BATTS. Black Rust in cereals.
Miss MARGARET KEAY. Specialization in parasitism of *Phytophthora infestans*.
Miss D. M. TURNER. Cereal Mildew.
R. LEACH. Chocolate Spot of beans.
H. E. CROXALL. Brown Rot of apples and plums.

ANNUAL GENERAL MEETING, 1951

The fifty-fifth Annual General Meeting was held in the rooms of the Linnean Society of London, at 12 noon on Saturday, 8 December 1951, with the President, Dr P. H. Gregory, in the chair.

After the Minutes of the previous Annual General Meeting had been read and signed Dr Gregory recorded with regret the deaths of Miss J. Eyre and Miss E. F. Noel.

Reviewing his year of office Dr Gregory extended to Miss E. M. Wakefield the good wishes of all members in her retirement from Kew, and voiced the Society's regret at the retirement from his office of Editor, of Mr W. C. Moore. The President also recorded the Society's debt to Dr G. R. Bisby for his work on the preparation of the Index to the *Transactions*, and acknowledged with thanks gifts to the Society's Library from Miss M. Brett and from Messrs Ainsworth, Beaumont, Foister, Hora, Porter, Smith and Sowter.

The Treasurer, W. Buddin, then presented his annual statement which was accepted, *nem. con.*, and acknowledged a grant to the Society of £200 from the Royal Society.

The following Officers and new Members of Council for 1951 were then elected: *President*, A. A. Pearson; *Vice-Presidents*, W. C. Moore, and the two past-Presidents, G. C. Ainsworth and P. H. Gregory; *Secretary*, C. J. Hickman; *Foray Secretary*, G. Smith; *Treasurer*, W. Buddin; *Editors*, P. H. Gregory and G. C. Ainsworth; *Members of Council*, M. B. Ellis and Mrs M. P. Topping (to replace Miss G. M. Waterhouse and R. K. S. Wood). E. Lester, S. H. Crowdy and P. H. Gregory were elected new members of the Plant Pathology Committee (to replace W. G. Keyworth, R. W. Marsh and Miss F. Joan Moore).

On a motion from the Chair, W. Watson and W. C. Moore were elected Honorary Members. Fourteen new members were elected making a total of fifty-seven new members and two new associates for the year.

Two resolutions from Council were then adopted: (1) 'that having regard to the considerable increase in cost of publication of the *Transactions*, the Council should be empowered to raise the minimum membership subscription to thirty shillings when it feels this step to be necessary'; (2) 'that the capital and accrued interest of the Lister Bequest be used for the purchase of rare and special books for the Society's Library; that the Library Committee be asked to draw up a short list of such books and to fix a maximum price to be paid, and that one member of the Committee be empowered to purchase within this price limit when second-hand copies come on the market'.

After drawing attention to the value of keeping the lists of British fungi up to date, M. B. Ellis outlined proposals for indexing new species and new records.

Following a brief discussion of the 1952 programme the meeting concluded with a vote of thanks to the Officers moved by the President.

The Annual General Meeting was followed, at 2.30 p.m., by a Lister Memorial Lecture on 'The Physiology of Myxomycetes', which was given by Dr Lilian E. Hawker.

RECEIPTS AND PAYMENTS for the year ended 30 June 1951

	£	s.	d.	£	s.	d.
1 July 1950, Balance brought forward ...				2140	11	11
Cambridge University Press:						
Sale of *Transactions*, Vol. XXXIII	543	8	0			
Back Volumes and reprints	281	0	5			
Current reprints	33	5	8			
				857	14	1
Sales:						
List of Common Names	4	5	6			
Diseases of British Grasses	2	12	0			
Publications at Meetings	42	14	9			
				49	12	3
Subscriptions:						
Arrears	1	0	0			
Current	506	15	9			
In advance	14	10	0			
Associates	15	1	0			
Income Tax repayment	93	18	4			
				631	5	1
Donations:						
Printing Fund	5	10	0			
Cheesman, Pethybridge and Library Funds	7	0	0			
Hospitality Fund	1	0	0			
				13	10	0
Interest:						
Capital Reserve Fund	40	7	6			
Post Office Savings Bank	34	5	11			
				74	13	5
				£3767	6	9

	£	s.	d.	£	s.	d.
Cambridge University Press:						
Cost of production of *Transactions*:						
Vol. XXXIII (900 copies) and reprints ...				1631	5	6
Purchase of *Transactions*, reprints, etc. ...				11	1	6
Grants:						
Cheesman and Pethybridge Funds ...	8	5	0			
Hospitality Fund	6	7	5			
				14	12	5
Subscriptions:						
Woolhope Club	1	0	0			
Council for Promotion of Field Studies ...	1	1	0			
British Co-ordination Committee for Nature Conservation	2	0	0			
				4	1	0
Purchase of Savings Certificates (Lister Fund, etc.)				675	0	0
Postages, Stationery, etc.				50	3	3
Printing:						
Sundry	48	5	5			
Key to Genera of Agarics and Boleti ...	62	15	6			
				111	0	11
Library purchases and printing				53	7	7
Fees for Meetings				6	0	3
Balance:						
At Midland Bank £517 1 4						
Less unpresented cheque ... 2 10 0	514	11	4			
In Post Office Savings Bank	696	3	0			
				1210	14	4
				£3767	6	9

CAPITAL RESERVE FUND ACCOUNT (*incorporating the Cheesman, Lister, Pethybridge and Printing Funds*)

Nominal values of Stock

3½% War Stock	£625	*Total* £2000
3% Defence Bonds	£200	
2½% Defence Bonds	£500	
Savings Certificates	£675	

Examined and found correct, W. C. MOORE, 23 August 1950.

(*Signed*) *WALTER BUDDIN*, *Hon. Treasurer.*

THE MARLBOROUGH FORAY

25–27 May 1951

By G. SMITH, *Foray Secretary*

The thirty-second Spring Foray was held at Marlborough, Wiltshire, from Friday, 25 May to Sunday, 27 May 1951. By kind permission of the Master of Marlborough College, of Dr A. K. Goard, the Senior Science Master, and of Mr J. H. Halliday, President of the Natural History Society, working headquarters were at the Mount House and, from Saturday noon, in the biological laboratories of the College.

On Friday, in bright sunshine, part of the extensive Savernake Forest in the vicinity of the Monument, was explored. As was to be expected, most of the specimens collected were of wood-inhabiting fungi, but a few agarics were found, including *Tricholoma gambosum*, which some members had not seen previously, and the beautiful and uncommon *Pluteus luteo-virens*.

Saturday was spent in visiting Birch Copse, a Forestry Commission plantation in Savernake Forest, and the adjoining Bedwyn Common. Again a fair number of fungi were found, representative of most groups except the Hyphomycetes.

The programme for Sunday included the canal at Wooten Rivers and the hill slopes at Martinsell, but persistent rain discouraged prolonged search and members were glad to return early to the laboratories, to continue work on material collected on the previous days. However, a number of rusts were found and a fine clump of *Bolbitius vitellinus*. Later in the day two members went to explore Stype Wood, near Hungerford, and an area around Folly Farm, Great Bedwyn, and returned with a number of interesting finds, including *Calvatia caelata* and the only morel collected during the week-end.

A short meeting was held on Sunday afternoon at which the location of the 1952 Spring Foray was discussed. The meeting also considered favourably a suggestion from Mr A. A. Pearson that a key to the genera of Discomycetes, based on Dr Ramsbottom's 1913 list, should be issued as a Foray Committee publication. Proceedings terminated with hearty votes of thanks to the Master of Marlborough College and his staff, and to Mr John Wildash for permission to visit Birch Copse.

Grateful acknowledgement is made to all who assisted in compiling the list of specimens, and particularly to Dr R. P. Korf, of Cornell University, who collected and identified most of the Discomycetes recorded.

List of species recorded

B. = Birch Copse; *F* = Folly Farm; *M.* = Martinsell; *S.* = Savernake Forest; *St.* = Stype Wood.

Names without author citations for Agricales are taken from Pearson and Dennis, *Trans. Brit. mycol. Soc.* **31**, 145–190, 1948, those for other Hymenomycetes and for Gasteromycetes from Rea, *British Basidiomycetae*, 1922.

PHYCOMYCETES

Endogone pisiformis Link, *S.*

Peronospora aparines (de Bary) Gäum., on *Asperula odorata*, *B.*, on *Galium aparine*, *M.*, ficariae (Nees) Tul., on *Ranunculus ficaria*, *M.*, niessleana Berl., on *Alliaria petiolata*, *M.*

ASCOMYCETES

Taphrinales

Taphrina betulina Rostr., on *Betula*, *B.*

Pyrenomycetes

Anthostoma turgidum (Fr.) Nits., on *Fagus*, *S.*

Daldinia concentrica (Fr.) Ces. & de Not., *S.*

Diatrype stigma (Fr.) Fr., *S.*

Elaphomyces muricatus, *S.*

Eutypa flavovirens (Fr.) Tul., *B.*, *S.*, spinosa (Fr.) Tul., *S.*

Hypoxylon cohaerens (Fr.) Fr., on *Fagus*, *S.*, rubiginosum (Fr.) Fr., on ash, *S.*

Melanomma pulvis-pyrius (Pers.) Fuckel, on *Fagus* wood, *S.*

Xylaria hypoxylon (Fr.) Grev., *S.*

Discomycetes

Acetabula vulgaris Fuckel, *B.*

Bulgaria inquinans (Pers.) Fr., *B.*

Dasyscypha distinguenda (Karst.) Sacc., on wood, *S.*, fagicola (Phill.) Le Gal, on *Fagus* cupule, *S.*, nivea (Fr.) Sacc., on wood, *S.*, rhytismatis (Phill.) Sacc., on *Acer pseudoplatanus* leaves, *B.*, virginea (Fr.) Fuckel, on *Fagus* cupules and leaves, *Rubus fructicosus* stems, and *Larix* cones, *B.*

Helotium advenulum (Phill.) Boud., on *Larix* needles, *B.*, cyathoideum (Fr.) Karst., on *Urtica dioica* stems, *S.*

Hyaloscypha hyalina (Fr.) Boud., on wood, *S.*, stevensoni (B. & Br.) Nannf., on coniferous wood, *S.*

Genea klotzschii, B. &. Br., *S.*

Mollisia sp., on wood, *S.*

Morchella rotunda Pers., *St.*

Orbilia chrysocoma (Fr.,) Sacc. var. microspora Sacc., on wood, *S.*

Peziza sylvestris (Boud.) Sacc., on rotten *Fagus* log, *S.*

Rhytisma acerinum (Pers.) Fr., on *Acer pseudoplatanus*, *B.*

Sclerotinia candolleana (Lév.) Fuckel, on *Quercus* leaves, *B.*

Trichoscyphella calycina (Fr.) Nannf., on fallen *Larix* branchlets, *B.*, willkommii (Hartig) Nannf., on *Larix*, *B.*

BASIDIOMYCETES

Ustilaginales

Urocystis anemones (Pers.) Wint., on *Ranunculus*, *M.*

Ustilago longissima (Schlecht.) Magn., *B.*, *M.*, striiformis (Westend.) Niessl, *B.*

Uredinales

Coleosporium senecionis Fr., on *Pinus*, *S.*, tussilaginis Tul., on *Tussilago farfara*, *M.*

Kuehneola albida (Kühn) Magn., *S.*

Melampsora rostrupii Wagner, on *Mercurialis perennis*, *M.*

Phragmidium fragariastri Schroet., on *Potentilla*, *B.*, violaceum Wint., *B.*

Puccinia adoxae Hedw., on *Adoxa moschatellina*, *M.*, caricis Reb., on *Urtica dioica*, *M.*, fusca (Pers.) Wint., on *Anemone nemorosa*, *B.*, phalaridis Plowr., on *Arum maculatum*, *M.*, saniculae Grev., on *Sanicula europea*, *M.*, suaveolens (Pers.) Rost., on *Cirsium arvense*, *M.*, *S.*, violae DC., on *Viola*, *B.*, *S.*

Uromyces ficariae Lév., on *Ranunculus ficaria*, *M.*, poae Rabenh., on *R. ficaria*, *M.*, scillarum Wint., on *Scilla nutans*, *B.*, *M.*, valerianae (Schum.) Fuckel, *S.*

AGARICALES

Bolbitius vitellinus, *M.*, *S.*
Coprinus plicatilis, *M.*
Galera graminea, *S.*, hypnorum, *B.*, *S.*
Hypholoma fasciculare, *S.*, sublateritium, *S.*
Naucoria pediades, *M.*
Nolanea cetrata, *B.*, staurospora, *B.*, *S.*
Panaeolus campanulatus, *B.*, *S.*
Pholiota aegerita, *B.*
Pleurotus dictyorrhizus, *B.*
Pluteus cervinus, *B.*, luteo-virens, *S.*
Psathyrella gracilis, *B.*, prona, *M.*, *S.*
Tricholoma gambosum, *S.*

APHYLLOPHORALES

Corticium byssinum, *S.*
Fomes ferruginosus, *B.*
Ganoderma applanatum, *S.*
Grandinia mucida, *S.*
Hymenochaete rubiginosa, *B.*
Polyporus chioneus, *B.*
Polystictus versicolor, *B.*, *S.*
Poria eupora, *B.*
Stereum hirsutum, *B.*, *S.*, purpureum, *B.*, *S.*
Trametes confragosa, *B.*, gibbosa, *B.*

AURICULARIALES

Auricularia auricula-judae, *B.*, *M.*

TREMELLALES

Dacryomyces deliquescens, *M.*
Exidia glandulosa, *B.*, *St.*
Tremella mesenterica, *S.*

GASTEROMYCETES

Bovista nigrescens, *S.*
Calvatia caelata (Bull.) Morg., *St.*
Lycoperdon pyriforme, *S.*
Phallus impudicus, *S.*

FUNGI IMPERFECTI

HYPHOMYCETES

Ovularia obliqua (Cooke) Oud., *B.*, on *Rumex*, *M.*

MYCETOZOA

Lycogala epidendrum Fr., *B.*, *S.*
Reticularia lycoperdon Bull., *B.*, *S.*
Trichia scabra Rost., *S.*

THE HEREFORD FORAY

12–19 September 1951

By G. SMITH, *Foray Secretary*

The forty-seventh Autumn Foray was held at Hereford, with headquarters at the Training College by kind permission of the Principal, Miss M. V. Daniel. The party of about eighty members was accommodated at the College and at Broadlands, a hostel some three-quarters of a mile away. Thanks to a grant from the British Council, Dr G. Haglund, of the Natural History Museum, Stockholm, attended the foray as the guest of the Society.

Following weeks of warm humid weather it was expected that fungi would be abundant everywhere, but, although the number of species recorded is large, and although it was not necessary to look far to find fungi, nowhere was the ground carpeted with them, as is often the case in seasons of similar weather.

The party assembled during the afternoon and evening of Wednesday, 12 September, and soon quite a number of specimens were on view, collected by early arrivals who had explored the grounds of the College. On Thursday there was a whole-day excursion to the Forest of Dean, where two of the Forestry Commission's plantations were worked. Fungi were by no means abundant but examples of many species were collected and, by the end of the evening, the display tables were almost completely filled, and a number of critical specimens were still awaiting identification. Two of these proved to be species new to Britain, *Hebeloma spoliatum* Fr. and *Lactarius lacunarum* (Romagn.) Lange, and it is interesting that both were collected in other localities later in the week.

Friday morning was spent by the more industrious members at work in the laboratory; others took the opportunity of shopping in the city. In the afternoon Dinmore Woods, which lie on high ground to the north of Hereford, were visited and a number of additions made to the list. One member at least was delighted to see a small collection of *Cortinarius sanguineus* brought in, the only collection made during the week.

On Saturday there was a whole-day foray in Moccas Park, where the open pastures provided a welcome change from woodland. Species of *Mycena* were much in evidence and some particularly fine specimens of *Armillaria mellea* were seen, growing around a doomed ash tree. In the evening the President, Dr P. H. Gregory, delivered his Presidential Address, entitled 'Fungus spores'.

On Sunday there was no organized excursion, so many members took the opportunity of visiting some of the beauty-spots within easy reach. Others spent a most interesting and profitable afternoon in the famous 'chained library' of Hereford Cathedral, whilst some found their time fully occupied in working at the material collected during the previous three days.

The Society was joined by members of the Worcester Naturalists' Club in an excursion to Downton Gorge on Monday. The driver of the leading coach did not seem to be familiar with that part of the county, but, after some extra miles of narrow lanes, he succeeded in bringing the party safely to its destination. Again there was no abundance of fungi, but there were sufficient to make collecting interesting and profitable. Two additions were made to the British list, *Hygrophorus cantharellus* (Schw.) Fr. and *Lepiota sericea* (Cool) Huysman. Some very fine specimens of *Amanitopsis inaurata* were found and many species of *Hygrophorus* were collected on the grassy slopes overlooking part of the gorge. In the afternoon the collectors of Mycetozoa found a spot so much to their liking that they forgot the time and only just escaped being left behind by the return coaches.

The last foray was on Tuesday morning to Haugh Woods, where there were areas of native oak interspersed with plantations of larch. *Boletus elegans* was fairly abundant beneath the conifers, and the photographers of the party were soon busy taking colour films. Some specimens of *Galera brunnea* (Kühner) Lange provided the final addition to the list of new records for Britain, but perhaps the most interesting finds were four clumps of *Lepiota procera*, all growing on ant-hills.

At a meeting on Friday evening, the foray arrangements for 1952 were discussed. It was announced that the invitation of the French Mycological Society to join their Autumn Foray had been accepted, and that the centre would be in the neighbourhood of Le Mans. Some discussion took place on the advisability of having an alternative foray in Britain, but eventually this idea was abandoned. On the motion of the Foray Secretary votes of thanks were passed with acclamation to: The Forestry Commissioners for permission to visit their plantations; to Sir William Cornwall for permission to hold a foray in Moccas Park; to Miss Daniel and the staff of the College for providing excellent accommodation; to the President and Secretary of the Woolhope Club for assistance in arranging the excursions; and to the Secretary, Dr C. J. Hickman, whose manifold labours behind the scenes had ensured a most enjoyable foray. After the meeting Mr John Brooke gave to a very appreciative audience a display of coloured slides of agarics.

List of species recorded

D. = Forest of Dean; *Dg.* = Downton Gorge; *Di* = Dinmore woods; *H.* = Haugh woods; *Hd.* = in and around Hereford; *M.* = Moccas Park. * New record for Britain.

Names without author citations for Agaricales are taken from Pearson and Dennis, *Trans. Brit. mycol. Soc.* **31**, 145–190, 1948; for other Hymenomycetes and for Gasteromycetes from Rea, *British Basidiomycetes*, 1922; and for Discomycetes from Ramsbottom and Balfour-Browne, *Trans. Brit. mycol. Soc.* **34**, 38–137, 1951.

PHYCOMYCETES

Cystopus candidus (Chev.) Lév., on *Capsella bursa-pastoris*, *Hd.*, *M.*, *Thlaspi arvense*, *M.*, *Rorippa amphibia*, *M.*, *R. islandica*, *M.*

Dictyuchus magnusii Lindst., from the river, *Dg.*

Peronospora grisea Unger, on *Veronica beccabunga*, *M.*

Phytophthora syringae (Kleb.) Kleb., on submerged *Salix* leaf, *M.*

Pseudoperonospora humuli (Miyabe & Tak.) Wilson, on *Humulus lupulus*, *M.*, urticae (Berk.) Salm. & Ware, on *Urtica dioica*, *M.*

ASCOMYCETES

Pyrenomycetes

Anthostomella punctulata (Rob. & Desm.) Sacc., on *Carex pendula*, *M.*
Claviceps purpurea (Fr.) Tul., on *Lolium*, *Agropyron* and *Arrhenatherum*, *Hd*, *M.*
Cordyceps militaris (Fr.) Link, *M.*
Cryptosphaeria eunomia (Fr.) Fuckel, on *Fraxinus*, *Di.*
Daldinia concentrica (Fr.) Ces. & de Not., on *Fraxinus*, *M.*
Diaporthe leiphemia (Fr.) Sacc., on *Quercus*, *D.*, *Di.*, *H.*
Diatrype disciformis (Fr.) Fr., on *Fagus*, *D.*, stigma (Fr.) Fr., on various hosts, *D.*, *Dg.*, *Di.*, *H*
Diatrypella favacea (Fr.) Ces. & de Not., on *Betula* and *Corylus*, *Dg.*, *Di.*, quercina (Fr.) Cooke, on *Quercus*, *D.*, *Dg.*, *Di.*, *H.*
Didymosphaeria palustris (Berk. & Br.) Sacc., on *Carex pendula*, *M.*
Dothidella trifolii Bayliss Elliott & Stansf., on *Trifolium*, *Di.*
Elaphomyces granulatus Fr., *D.*, muricatus Fr., *D.*
Epichloe typhina (Fr.) Tul., on *Agrostis*, *M.*
Erysiphe polygoni DC., on *Heracleum sphondylium*, *Di.*
Eutypa flavovirens (Fr.) Tul., on *Fagus* and *Corylus*, *D.*, *Dg.*, *H.*
Hypoderma virgultorum Sacc., on *Rubus fructicosus*, *D.*
Hypoxylon coccineum Bull., on *Fagus* and *Corylus*, *D.*, *H.*, fuscum (Fr.) Fr., on *Corylus*, *D.*, *Dg.*, *H.*, multiforme (Fr.) Fr., on *Betula*, *D.*, *Dg.*, *Di.*, rubiginosum (Fr.) Fr., on *Fraxinus*, *D.*, *Di.*, *H.*, serpens (Fr.) Fr., on *Quercus*, *D.*
Lasiosphaeria hirsuta (Fr.) Ces. & de Not., on rotten wood, *D.*, ovina (Fr.) Ces. & de Not., on *Fagus*, *D.*, *Di.*, spermoides (Fr.) Ces. & de Not., on *Fagus* and *Fraxinus*, *D.*, *Di.*
Leptosphaeria doliolum (Fr.) de Not., on *Urtica dioica*, *M.*
Microsphaera alphitoides Griff. & Maubl., on *Quercus*, *H.*
Nectria cinnabarina (Fr.) Fr., on *Fagus*, *M.*
Niesslia exosporioides (Desm.) Wint., on *Carex pendula*, *M.*
Ophionectria cerea (B. &. C.) Ellis & Everh., on *Diatrype* on *Fagus*, *D.*
Ophiosphaeria gracilis (Niessl) Kirschst., on *Carex pendula*, *M.*
Phomatospora therophila (Desm.) Sacc., on *Juncus*, *M.*
Phyllachora graminis (Fr.) Fuckel, on *Dactylis glomerata*, *Hd.*
Phyllactinia corylea (Pers.) Karst., on *Corylus*, *H.*
Podosphaera oxyacanthae (DC.) de Bary, on *Crataegus*, *Hd.*
Podostroma alutaceum (Fr.) Atkinson, on conifer and *Quercus*, *Dg.*, *Di.*
Rhopographus filicinus (Fr.) Fuckel, on *Pteridium aquilinum*, *D.*
Stigmatea robertiani (Fr.) Fr. on *Geranium robertianum*, *D.*
Trichosphaeria myriocarpa (Fr.) Petrak & Sydow, on *Quercus*, *D.*
Tympanopsis euomphala (Berk. & Curt.) Starb., on *Fraxinus*, *D.*
Uncinula aceris (DC.) Sacc., on *Acer*, *H.*
Ustulina deusta (Fr.) Petrak, on *Fagus*, *D.*
Xylaria hypoxylon (Fr.) Grev., on *Fagus* and *Fraxinus*, *D.*, *Di.*, polymorpha (Fr.) Grev., on wood, *D.*, *Dg.*

Discomycetes

Aleuria repanda, *D.*, subrepanda, *Di.*, umbrina, *D.*
Arachnopeziza aranea, *M.*
Ascobolus stercorarius, *M.*
Bulgaria inquinans, *D.*, *Dg.*, *Di.*
Calycella citrina, on wood, *D.*, *Dg.*, lenticularis, *Di.*, sulfurina, *D.*
Cenangium pulveraceum, *D.*
Ciboria sydowiana, *D.*
Ciliaria scutellata, *D.*, on *Betula*, *Dg.*
Coprobria granulata, *D.*
Coryne sarcoides, *D.*, *Di.*
Cudoniella acicularis, *D.*
Dasyscypha caeruleo-alba* Rehm, *M.*, ciliaris, *D.*, controversa, *M.*, helotioides (Rehm) Dennis, *M.*, virginea, *D.*, *Di.*, *M.*

Galactinia succosa, *D.*
Gyromitra phillipsii, *M.*
Haglundia perelegans* (Hagl.) Nannf., *D.*
Helotium cyathoideum, *D.*, fructigenum, *M.*
Helvella lacunosa, *D.*
Hyaloscypha hyalina, *M.*
Lachnea hemispherica, *M.*
Leotia lubrica, *Dg.*
Macropodia macropus, *D.*
Mollisia caricina* Fautrey, *M.*, cinerea, *D.*, *M.*, discolor, *D.*
Neobulgaria pura* (Fr.) Petr., *D.*
Niptera pulla, on *Phalaris* and *Scirpus*, *M.*
Orbilia leucostigma, *Di*, xanthostigma, *D.*, *Di.*
Peziza aurantia, *D.*
Phialea echinophila, *M.*, firma, *D.*
Polydesmia pruinosa, *D.*
Propolis faginea, *D.*
Sarcoscypha coccinea, on wood, *Dg.*
Trichopeziza caesia, *D.*, dematiicola, *Di.*
Trichoscypha calycina, on *Larix*, *Hd.*, willkommii, *D.*, *Hd.*, *M.*
Urceolella leuconica, *D.*, stevensoni, *D.*

BASIDIOMYCETES

Ustilaginales

Sphacelotheca hydropiperis (Schum.) de Bary, on *Polygonum hydropiper*, *M.*
Ustilago striiformis (Westend.) Niessl, on *Holcus mollis*, *Hd.*

Uredinales

Coleosporium melampyri Karst., on *Melampyrum pratense*, *H.*, senecionis Fr., on *Senecio vulgaris*, *H.*, tussilaginis Kleb., on *Tussilago farfara*, *D.*, *Hd.*
Frommea obtusa (Strauss) Arth., on *Potentilla erecta*, *D.*, *M.*
Kuehneola tormentillae Arthur, on *Potentilla erecta*, *D.*, *Hd.*, uredinia (Link) Arth., on *Rubus fructicosus*, *D.*, *Di.*
Melampsora hypericorum Wint., on *Hypericum H. androsaemum*, *humifusum* and *H. pulchrum*, *D.*, *Dg.*, *Hd.*, tremulae Tul., on *Populus tremula*, *D.*
Melampsoridium betulinum Kleb., on *Betula pendula* and *B. pubescens*, *D.*, *H.*, *Hd.*, on *B. pendula*, *D.*
Milesina scolopendrii Jaap, on *Phyllitis scolopendrium*, *Dg.*
Phragmidium disciflorum James, on *Rosa* sp., *H.*, *M.*, fragariastri Schroet., on *Potentilla sterilis*, *Dg.*, *M.*, rubi (Pers.) Wint., on *Rubus fructicosus*, *Di.*, sanguisorbae Schroet., on *Poterium sanguisorba*, *D.*, *Dg.*, violaceum Wint., on *Rubus* sp., *D.*, *Hd.*
Puccinia annularis Schlecht., on *Teucrium scorodonia*, *H.*, asperulae-odoratae Wurth., on *Asperula odorata*, *Hd.*, baryi Wint., on *Brachypodium sylvaticum*, *Dg.*, betonicae DC., on *Stachys officinalis*, *H.*, bromina Erikss., on *Festuca gigantea*, *Dg.*, *Hd.*, buxi DC., on *Buxus sempervirens*, *M.*, caricis Red., on *Carex elata*, *C. pendula* and *C. vesicaria*, *M.*, chaerophylli Purton on *Chaerophyllum* sp., *M.*, chrysosplenii Grev., on *Chrysosplenium oppositifolium*, *D.*, *M.*, circaeae Pers., on *Circaea lutetiana*, *D.*, *Dg.*, *Hd.*, *M.*, cirsii Lasch, on *Cirsium palustre*, *D.*, *Dg.*, *Hd.*, *M.*, cirsii-lanceolata Schroet., on *C. vulgare*, *Dg.*, conii Fckl., on *Conium maculatum*, *Dg.*, coronata Corda, on oats, *Hd.*, on *Holcus mollis*, *H.*, glechomatis DC., on *Glechoma hederacea*, *Dg.*, *Hd.*, graminis Pers., on oats, *M.*, leontodontis Jacky, on *Leontodon autumnalis*, *Hd.*, lychnidearum Link, on *Arenaria trinervia*, *Hd.*, major Dietel, on *Crepis paludosa*, *M.*, malvacearum Mont., on *Malva rotundifolia* and *M. sylvestris*, *Hd.*, menthae Pers., on *Mentha aquatica*, *D.*, *Hd.*, millefolii Fuckel, on *Achillea millefolium*, *Hd.*, oblongata (Link) Wint., on *Luzula sylvatica*, *D.*, *Di.*, obscura Schroet., on *L. sylvatica*, *D.*, *Dg.*, *H.*, *Hd.*, poarum Niels., on *Tussilago farfara*, *D.*, primulae (DC.) Duby, on *Primula vulgaris*, *M.*, punctata Link, on *Galium palustre*, *M.*, saniculae Grev., on *Sanicula europaea*, *Di.*, sonchi Rob., on *Sonchus asper*, *Di.*, suaveolens Pers., on *Cirsium arvense*, *Di.*, *Hd.*, *M.*, taraxaci Plowr., on *Taraxacum officinale*, *D.*, *H.*, *M.*, tragopogi Corda, on *Tragopogon pratensis*,

Di., valantiae Pers., on *Galium saxatile*, *D.*, veronicae (Schum.) Schroet., on *Veronica montana*, *D.*, *M.*, violae DC., on *Viola canina* and *V. riviniana*, *D.*, *Di.*, *H.*, *M.*

Pucciniastrum agrimoniae Tranzschel, on *Agrimonia eupatoria*, *Di.*, circaeae Speg., on *Circaea lutetiana*, *D.*, *Di.*, *Hd.*, *M.*, pustulatum Dietel, on *Chamaenerion angustifolium*, *D.*

Thekopsora vacciniorum (DC.) Karst., on *Vaccinium myrtillus*, *D.*

Triphragmium ulmariae Wint., on *Filipendula ulmaria*, *Di.*

Uromyces dactylidis Otth, on *Dactylis glomerata*, *M.*, fabae de Bary, on *Lathyrus pratensis*, *H.*, flectens Lagerh., on *Trifolium repens*, *D.*, *M.*, genistae-tinctoriae (Pers.) Wint., on *Sarothamnus*, *D.*, orobi Lév., on *Lathyrus montanus*, *D.*, *H.*, rumicis Wint., on *Rumex* sp., *M.*, scrophulariae Fuckel, on *Scrophularia aquatica*, *Dg.*

Agaricales

Amanita citrina, *D.*, *Dg.*, *Di.*, citrina var. alba, *Dg.*, *H.*, eliae, *H.*, excelsa, *D.*, *Di.*, *H.*, muscaria, *D.*, *Dg.*, *Di.*, pantherina, *D.*, *H.*, *M.*, phalloides, *D.*, *Dg.*, *Di.*, *H.*, porphyria, *Di.*, rubescens, *D.*, *Dg.*, *Di.*, *H.*, *M.*

Amanitopsis fulva, *Di.*, inaurata, *Dg.*, *Di.*, vaginata, *D.*, *Di.*, *M.*

Armillaria mellea, *D.*, *Dg.*, *Di.*, *H.*, *M.*, mucida, *D.*, *H.*, *M.*

Bolbitius vitellinus, *Dg.*, *M.*

Boletus badius, *D.*, chrysenteron, *D.*, *Dg.*, *H.*, *M.*, cramesinus, *H.*, edulis, *D.*, *H.*, elegans, *D.*, *Di.*, *H.*, *M.*, erythropus, *M.*, impolitus, *M.*, luridus, *H.*, parasiticus, *D.*, pinicola, *D.*, piperatus, *Dg.*, pulverulentus, *D.*, *Dg.*, *Di.*, *M.*, queletii, *Dg.*, *H.*, reticulatus, *H.*, scaber, *D.*, *Dg.*, *Di.*, *H.*, subtomentosus, *D.*, *Di.*, *H.*, *M.*, versicolor, *D.*, *M.*, versipellis, *D.*, *Di.*, *M.*

Cantharellus amethysteus, *Dg.*, cibarius, *D.*, *Dg.*, *Di.*, *H.*, cinereus, *M.*, tubaeformis, *H.*

Clitocybe aurantiaca, *D.*, *M.*, cerussata, *M.*, clavipes, *D.*, *H.*, ditopus, *D.*, flaccida, *D.*, fragrans, *Dg.*, infundibuliformis, *D.*, *Dg.*, *Di.*, *H.*, *M.*, nebularis, *Dg.*, odora, *Dg.*, rivulosa, *Dg.*, *Di.*, *M.*

Clitopilus cretatus, *M.*, prunulus, *D.*, *Di.*, *H.*, *M.*

Collybia butyracea, *D.*, *H.*, cirrhata var. cookei, *H.*, clusilis, *D.*, fusipes, *D.*, *Di.*, *H.*, *M.*, longipes, *M.*, maculata, *D.*, platyphylla, *D.*, *Dg.*, *Di.*, *H.*, radicata, *D.*, *Dg.*, *Di.*, *H.*, *M.*, rancida, *D.*, *M.*, tuberosa, *Dg.*, velutipes, *M.*

Coprinus atramentarius, *D.*, comatus, *D.*, *Di.*, *H.*, friesii, *M.*, micaceus, *D.*, *Di.*, *H.*, *M.*, niveus, *M.*, picaceus *M.*, plicatilis, *Dg.*, *M.*

Cortinarius anomalus, *D.*, *Dg.*, *Di.*, *H.*, causticus, *Dg.*, cinnamomeus, *Dg.*, collinitus, *D.*, *H.*, delibutus, *H.*, decipiens, *Dg.*, *Di.*, elatior, *D.*, *Dg.*, *Di.*, *H.*, *M.*, erythrinus, *Dg.*, *Di.*, flexipes, *D.*, *Dg.*, *H.*, glandicolor, *D.*, *M.*, glaucopus, *Di.*, *H.*, hinnuleus, *D.*, *Dg.*, *Di.*, *H.*, *M.*, hoefftii, *H.*, largus, *H.*, lepidopus, *Dg.*, leucopus, *D.*, multiformis, *H.*, obtusus, *D.*, *Di.*, ochroleucus, *H.*, paleaceus, *Dg.*, pholideus, *H.*, psammocephalus, *M.*, purpurascens, *H.*, raphanoides, *Dg.*, rigens, *H.*, rigidus, *Dg.*, *Di.*, sanguineus, *Di.*, *H.*, semi-sanguineus, *H.*, torvus, *D.*, *Dg.*, *Di.*

Craterellus cornucopioides, *D.*, *Dg.*, *Di.*, *H.*, *M.*, sinuosus, *D.*

Crepidotus mollis, *M.*, pubescens, *D.*, *H.*, variabilis, *Di.*, *H.*, *M.*

Eccilia cancrina, *M.*

Entoloma jubatum, *Di.*, lividum, *H.*, *M.*, nidorosum, *D.*, *Dg.*, *Di.*, *H.*, porphyrophaeum, *Dg.*, *M.*, rhodopolium, *D.*, *Di.*, *H.*, sericeum, *Dg.*, *M.*, turbidum, *Dg.*

Flammula alnicola, *Dg.*, flavida, *D.*, gummosa, *Di.*, spumosa, *H.*

Galera hypnorum, *Dg.*, *Di.*, *M.*, brunnea* (Kühner) Lange, *H.*, tenera, *Dg.*, *M.*

Gomphidius maculatus, *H.*, rutilus, *Di.*

Gyroporus castaneus, *D.*, *Dg.*

Hebeloma crustuliniforme, *D.*, *Dg.*, *Di.*, *H.*, mesophaeum, *D.*, *Di.*, *M.*, radicatum (Cooke) Maire, *D.*, sinapizans, *Di.*, spoliatum* Fr., *D.*, *H.*

Hygrophorus calyptraeformis, *Dg.*, cantharellus* (Schw.) Fr., *Dg.*, ceraceus, *D.*, chlorophanus, *D.*, *Dg.*, *H.*, *M.*, coccineus, *Dg.*, *M.*, conicus, *M.*, langei Kühner, *H.*, cossus, *Di.*, eburneus, *Di.*, intermedius, *D.*, *M.*, lacmus, *Dg.*, miniatus, *Dg.*, nigrescens, *Dg.*, *M.*, nitratus, *Dg.*, *M.*, niveus, *Di.*, obrusseus, *M.*, pratensis, *D.*, *Dg.*, *M.*, psittacinus, *D.*, *Dg.*, *Di.*, *M.*, puniceus, *Dg.*, sciophanus, *M.*, unguinosus, *Dg.*, *M.*, virgineus, *Dg.*, *M.*

Hypholoma candolleanum, *Dg.*, *H.*, *M.*, fasciculare, *D.*, *Di.*, *H.*, *M.*, hydrophilum, *D.*, *Di.*, *H.*, *M.*, leucotephrum, *Di.*, sublateritium, *Di.*, velutinum, *D.*, *Di.*

Inocybe asterospora, *D.*, *Di.*, *M.*, auricoma, *Dg.*, cincinnata, *Dg.*, cookei, *D.*, *Di.*, *H.*, *M.*, deglubens, *M.*, dulcamara, *Di.*, eutheles, *D.*, fastigiata, *Dg.*, geophylla, *D.*, *Dg.*, *Di.*, *H.*, *M.*, geophylla var. lilacina, *D.*, *Dg.*, godeyi, *Dg.*, *H.*, griseo-lilacina, *D.*, jurana Pat., *D.*, maculata, *D.*, napipes, *D.*, obscura, *Dg.*, *M.*, petiginosa, *D.*, *Dg.*, *H.*, praetervisa, *D.*, pyriodora, *M.*, scabella, *M.*, umbrina, *D.*

Laccaria amethystina, *D.*, *Dg.*, *Di.*, *H.*, *M.*, laccata, *D.*, *Di.*, *H.*, *M.*

Lactarius blennius, *D.*, *Dg.*, *M.*, camphoratus, *D.*, *Di.*, *M.*, controversus, *D.*, deliciosus, *D.*, fuliginosus, *D.*, *Di.*, *H.*, glycyosmus, *D.*, *Dg.*, *Di.*, *H.*, lacunarum,* (Romagn.) Lange, *D.*, *Dg.*, *Di.*, mitissimus, *Dg.*, *H.*, pallidus, *Dg.*, *M.*, piperatus, *D.*, plumbeus, *Di.*, pyrogalus, *D.*, *Dg.*, *Di.*, *H.*, quietus, *D.*, *Dg.*, *Di.*, *H.*, *M.*, resimus, *Di.*, *H.*, serifluus, *Dg.*, *Di.*, *H.*, *M.*, spinosulus, *D.*, *Dg.*, subdulcis, *D.*, *Di.*, torminosus, *Dg.*, *Di.*, *H.*, vellereus, *D.*, *Dg.*, *Di.*, *H.*, vietus, *Dg.*, *H.*, volemus, *D.*

Lepiota amianthina, *Dg.*, *Di.*, *M.*, cristata, *D.*, *M.*, mastoidea, *Di.*, *M.*, procera, *D.*, *M.*, rhacodes, *D.*, *H.*, *M.*, sericea* (Cool) Huysman, *Dg.*, sistrata, *D.*, *Dg.*

Leptonia euchroa, *M.*, lampropus, *D.*, *Dg.*, sericella, *Dg.*, *Di.*, *M.*

Marasmius acervatus, *Dg.*, *H.*, *M.*, androsaceus, *H.*, confluens, *Dg.*, dryophilus, *D.*, *M.*, fuscopurpureus, *D.*, oreades, *D.*, *Dg.*, *Di.*, *M.*, peronatus, *D.*, *Di.*, *H.*, *M.*, ramealis, *D.*, *H.*, *M.*, rotula, *D.*, *Dg.*, *H.*, *M.*, undatus, *D.*, *M.*

Mycena acicula, *D.*, *H.*, *M.*, adonis, *M.*, alcalina, *D.*, *H.*, amicta, *D.*, *H.*, avenacea, *D.*, *Dg.*, *M.*, bulbosa, *M.*, epipterygia, *M.*, filopes, *D.*, galericulata, *D.*, *Di.*, *H.*, *M.*, galopus, *D.*, *Dg.*, *H.*, *M.*, galopus var. alba, *Dg.*, gypsea *sensu* Kühner, *M.*, metata, *Dg.*, *Di.*, pelianthina, *Dg.*, *M.*, polygramma, *D.*, *Dg.*, *Di.*, *H.*, pura, *Dg.*, *H.*, *M.*, rorida, *D.*, sanguinolenta, *D.*, *Dg.*, *H.*, *M.*, speirea, *M.*, stylobates, *Dg.*, tenerrima, *H.*, vitilis, *D.*, *M.*

Naucoria cucumis, *D.*, erinacea, *M.*, scolecina, *Di.*

Nolanea papillata, *D.*, *Dg.*, staurospora, *Dg.*

Nyctalis parasitica, *Di.*, *H.*

Omphalia fibula, *D.*, *Dg.*, *M.*, fibula var. nivalis, *Di.*, fibula var. swartzii, *Dg.*, *M.*, grisella, *Dg.*, hydrogramma, *M.*, rosella, *Dg.*

Panaeolus campanulatus, *D.*, *Dg.*, *M.*

Panus stipticus, *D.*, *Di.*, *H.*, *M.*

Paxillus involutus, *D.*, *Dg.*, *Di.*, *H.*

Pholiota aegerita, *Hd.*, dura, *H.*, erebia, *H.*, mutabilis, *D.*, togularis, *M.*

Phylloporus rhodoxanthus, *D.*, *Dg.*

Pleurotus acerosus, *D.*, aleuriatus, *M.*, chioneus, *M.*, porrigens, *D.*

Pluteus cervinus, *Dg.*, *Di.*, *H.*, *M.*, cinereo-fuscus, *M.*, nanus, *D.*, *Di.*, *M.*, phlebophorus, *M.*, salicinus, *D.*, *M.*, semibulbosus, *H.*, umbrosus, *M.*

Porphyrellus porphyrosporus, *D.*

Psalliota amethystina, *D.*, *Di.*, arvensis, *D.*, *Dg.*, *M.*, campestris, *M.*, silvatica, *H.*, xanthoderma var. obscurata, *Dg.*

Psathyrella atomata, *M.*, disseminata, *Di.*, *M.*, gracilis, *Dg.*, gracilis var. corrugis, *Di.*, foenisecii, *M.*

Psilocybe semilanceata, *Di.*, *M.*

Russula adusta, *Dg.*, aeruginea, *D.*, albonigra, *Di.*, alutacea, *H.*, atropurpurea, *D.*, *Dg.*, *Di.*, *M.*, aurata, *Dg.*, *H.*, azurea, *Di.*, cyanoxantha, *D.*, *Di.*, *H.*, *M.*, delica, *D.*, *Dg.*, *Di.*, *H.*, emetica, *D.*, *Dg.*, *Di.*, exalbicans, *Dg.*, *Di.*, fallax, *D.*, *Dg.*, farinipes, *Di.*, *M.*, fellea, *Dg.*, foetens, *D.*, *Dg.*, *Di.*, *H.*, *M.*, fragilis, *Di.*, *H.*, gracillima, *Dg.*, grisea, *Dg.*, heterophylla, *D.*, *Di.*, *H.*, integra, *Di.*, *H.*, laurocerasi, *Dg.*, *Di.*, *M.*, lepida, *Dg.*, *Di.*, lutea, *Dg.*, *Di.*, *H.*, *M.*, maculata, *Dg.*, nigricans, *D.*, *Dg.*, *Di.*, *H.*, *M.*, ochroleuca, *D.*, *Dg.*, olivacea, *Di.*, pectinata, *H.*, *M.*, puellaris, *D.*, *H.*, romellii, *D.*, rosea, *H.*, solaris, *M.*, sororia, *D.*, *M.*, velenovskyi, *D.*, *Dg.*, *Di.*, vesca, *D.*, *Dg.*, *Di.*, virescens. *Di.*, xerampelina, *D.*, *M.*

Schizophyllum commune, *D.*

Stropharia aeruginosa, *D.*, *M.*, semiglobata, *D.*, *Dg.*, *M.*

Tricholoma aggregatum, *Di.*, album, *D.*, *Dg.*, atrocinereum, *D.*, *Dg.*, *M.*, carneum, *D.*, *Dg.*, *M.*, cinerascens, *Di.*, fulvum, *Dg.*, rutilans, *D.*, saponaceum, *Di.*, *H.*, saponaceum var. squamosum, *H.*, scalpturatum, *Dg.*, sejunctum, *M.*, sulphureum, *Dg.*, *Di.*, *H.*, terreum, *Di.*

Tubaria crobulus, *H.*, furfuracea, *H.*

Volvaria bombycina, *M.*

APHYLLOPHORALES

Clavaria cinerea, *D.*, corniculata, *Dg.*, cristata, *D.*, *Dg.*, *Di.*, *M.*, dissipabilis, *M.*, formosa, *Dg.*, rugosa, *D.*, stricta, *D.*, vermicularis, *M.*
Corticium praetermissum, *D.*
Daedalea biennis, *Dg.*, quercina, *D.*, *Di.*
Fistulina hepatica, *D.*, *Di.*, *M.*
Fomes connatus, *Dg.*, fraxineus, *M.*, igniarius, on *Salix*, *Hd.*, ulmarius, *Dg.*
Ganoderma applanatum, *D.*, *Dg.*, *M.*, resinaceum, *M.*
Grandinia farinacea, *M.*
Hydnum imbricatum, *H.*, repandum, *Dg.*, *H.*, repandum var. rufescens, *D.*
Hymenochaete corrugata, *D.*, rubiginosa, *Di.*
Irpex obliquus, *D.*
Lenzites betulina, *D.*
Odontia barba-jovis, *Di.*
Pellicularia pruinata, *D.*
Peniophora pallidula, *D.*, quercina, *D.*, *M.*, sanguinea, *D.*, setigera, *D.*, velutina, *D.*
Phlebia merismoides, *D.*
Polyporus adustus, *D.*, *Dg.*, betulinus, *Dg.*, *Di.*, caesius, *D.*, dryadeus, *M.*, fragilis, *H.*, giganteus, *D.*, *Dg.*, *Di.*, *M.*, hispidus, *Hd.*, lacteus, *D.*, *Dg.*, perennis, *H.*, rutilans, *H.*, squamosus, *M.*, sulphureus, *M.*, stipticus, *D.*, varius, *Di.*
Polystictus versicolor, *D.*, *Di.*, *H.*
Stereum hirsutum, *D.*, *H.*, *M.*, purpureum, *D.*, *H.*, *M.*, sanguinolentum, *H.*, spadiceum, *D.*
Trametes mollis, *D.*, *Dg.*, rubescens, *D.*, *Dg.*

AURICULARIALES

Auricularia auricula-judae, *Dg.*, *M.*

TREMELLALES

Exidia glandulosa, *Dg.*, nucleata, *D.*
Femsjonia luteo-alba, *D.*
Tremella lutescens, *D.*, mesenterica, *M.*

CALOCERALES

Calocera cornea, *D.*, *M.*, viscosa, *D.*

GASTEROMYCETES

Bovista nigrescens, *M.*, plumbea, *M.*
Calvatia caelata, *M.*, gigantea, *M.*
Crucibulum vulgare, *M.*
Geaster fimbriatus, *Dg.*
Lycoperdon depressum, *M.*, echinatum, *Dg.*, perlatum *D.*, *Di.*, *H.*, *M.*, pyriforme, *D.*, *Di.*, *H.*, umbrinum, *Dg.*, molle *M.*
Mutinus caninus, *D.*
Phallus impudicus, *D.*, *H.*
Scleroderma aurantiacum, *D.*, cepa, *D.*, verrucosum, *M.*
Sphaerobolus stellatus, *M.*

FUNGI IMPERFECTI

COELOMYCETES

Leptothyrium scirpinum (Fr.) Bub. & Kab., on *Scirpus*, *M.*
Neottiospora caricum Desm., on *Carex pendula*, *M.*

HYPHOMYCETES

Anguillospora longissima (Sacc. & Syd.) Ingold, from river debris, *Dg.*
Chalara pteridina Syd., on *Pteridium aquilinum*, *D.*
Dendryphion comosum Wallr., on *Urtica dioica*, *D.*
Epicoccum purpurascens Wallr., on *Scirpus*, *M.*

Helminthosporium simplex Fr., on *Fraxinus*, *Hd.*, velutinum Fr., on *Humulus lupulus*, *Hd.*

Lemoniera aquatica de Wild., on submerged *Salix* leaf, *M.*

Menispora ciliata Corda, on *Ilex aquifolium*, *D.*

Ovularia obliqua (Cooke) Oud., on *Rumex crispus*, *Hd.*

Papularia sphaerosperma (Fr.) von Höhn., on grass, *Di.*

Periconia atra Corda, on *Carex pendula*, on *Scirpus*, *M.*, byssoides Fr., on *Urtica dioica*, *D.*

Phragmocephala atra (B. & Br.) Mason & Hughes, on *Urtica dioica*, *D.*

Ramularia lactea (Desm.) Sacc., on *Viola riviniana*, *Di.*, parietariae Pass., on *Parietaria diffusa*, *Dg.*, urticae Ces., on *Urtica dioica*, *D.*

Tetracladium marchalianum de Wild, on submerged *Salix* leaf, *M.*

Tetraploa aristata B. & Br., on *Phalaris arundinacea*, *M.*

Trichoderma viride Fr., on *Fagus* and *Ilex*, *D.*

Tricladium angulatum Ingold, on submerged *Salix* leaf, *M.*

Torula herbarum (Pers.) Fr., on *Urtica dioica*, *M.*

MYCETOZOA

Arcyria cinerea Pers., *Dg.*, *Di.*, *M.*, denudata Sheldon, *Dg.*, *Di.*, *H.*, *M.*, incarnata Pers., *Dg.*, *Di.*, *H.*, *M.*, nutans Grev., *D.*, *M.*, pomiformis Rost., *M.*

Badhamia utricularis Berk., *H.*

Ceratiomyxa fruticulosa Macbr., *D.*, *Di.*, *H.*

Comatricha nigra Schroet., *Di.*, typhoides Rost., *Di.*

Craterium minutum Fr., *H.*

Cribraria argillacea Pers., *D.*, *Di.*, rufa Rost., *H.*

Dictydium cancellatum Macbr., *M.*

Didymium nigripes Fr., *D.*, *Di.*, *H.*, *M.*, squamulosum Fr., *D.*, *Dg.*

Fuligo septica Gmel., *Dg.*, *M.*

Lycogala conicum Pers., *M.*, epidendrum Fr., *Dg.*

Mucilago spongiosa Morgan, *Dg.*, *M.*

Physarum cinereum Pers., *Di.*, mutabile Lister, *Dg.*, nutans Pers., *M.*, viride Pers., *D.*, *M.*, viride var. aurantium Lister, *Dg.*

Reticularia lycoperdon Bull., *Dg.*, *M.*

Stemonitis flavogenita Jahn., *Dg.*, *Di.*, fusca Roth., *Di.*, *H.*, *M.*, fusca var. flaccida Lister, *H.*

Trichia affinis de Bary, *H.*, decipiens Macbr., *Di.*, persimilis Karst., *Dg.*, *Di.*, scabra Rost., *Dg.*, varia Pers., *M.*

Tubifera ferruginosa Gmel., *M.*

LICHENES

Arthopyrenia fallax (Nyl.) Arn., *Di.*

Calicium hyperellum Ach., *M.*

Cladonia fimbriata (L.) Fr., *Di.*, *M.*, floerkeana Fr., *Di.*, impexa Harm., *Di.*, macilenta Hoff. *Di.*, *M.*

Collema pulposum Ach., *Di.*

Diploicia canescens (Dicks.) Mass., *M.*

Evernia prunastri (L.) Ach., *Di.*, *M.*

Lecanora allophana (Ach.) Röhl., *Di.*, campestris (Schaer.) Hue, *M.*, conizaea (Ach.) Nyl., *Di.*, *M.*

Parmelia caperata (L.) Ach., *M.*, fuliginosa var. laetovirens (Flot.) Nyl., *Di.*, *M.*, physodes (L.) Ach., *Di.*, *M.*, saxatilis (L.) Ach., *Di.*, sulcata Tayl., *M.*

Peltigera canina (L.) Willd., *Di.*, rufescens (Weis.) Hoff., *Di.*, *M.*

Pertusaria amara (Ach.) Nyl., *M.*, pertusa (L.) Tuck., *M.*

Physcia pulverulenta (Schreb.) Nyl., *M.*

Platysma glaucum (L.) Nyl., *M.*

Ramalina fastigiata (Pers.) Ach., *M.*

Xanthoria parietina (L.) Fr., *M.*

LONDON AND PROVINCIAL FORAYS

Five one-day forays were held during the autumn in the London area. As was found at Hereford, agarics were nowhere abundant, tending to be confined to comparatively small areas, with larger areas almost completely barren.

On Saturday, 22 September, the Society combined with the Hertfordshire Natural History Society in a foray to Aldbury, near Tring. The highlight of the day was the finding of a clump of young sporophores of that elusive fungus *Strobilomyces strobilaceus.*

On Sunday, 30 September, Wimbledon Common was visited for the first time. The general impression was that another foray, in a more normal season, would be well worth while. Saturday, 6 October, was spent at Virginia Water, with tea and examination of specimens at the Royal Holloway College. Ruislip Woods were visited on Saturday, 13 October, and Oxshott on Sunday, 21 October.

The North-Western Naturalists' Union joined with local members of the B.M.S. in forays to Greenfield, Lancs., on Sunday, 30 September, and to Romiley, Cheshire, on Saturday, 13 October.

THE TWENTY-FIFTH ANNUAL PLANT PATHOLOGY FIELD DAY

13 July 1951

The Twenty-fifth Annual Field Day was held at Bristol. A party of about 60 members assembled at 10 a.m. at the Research Station, Long Ashton, and were welcomed on behalf of the Director, by Mr R. W. Marsh.

During the course of the morning various aspects of the research work in progress were explained. Mr Marsh outlined the work of the Mycology Section, and his account of their observations over a period of several years on the spread of *Armillaria mellea* in orchards stimulated a very interesting discussion. Outside on the orchard plots Dr H. G. H. Kearns demonstrated some new spray machinery. In the laboratories Dr L. C. Luckwill described the work on virus diseases of fruit trees, and Dr R. J. W. Byrde gave an account of his work on the control of Brown Rot and briefly referred to the experiments with systemic fungicides started by Dr S. H. Crowdy before he left for the United States of America.

At the end of a sandwich lunch, kindly provided by the Station, Dr S. D. Garrett, Chairman of the Plant Pathology Committee, thanked all those who had helped to contribute to such an instructive programme.

The afternoon was spent at the Provincial Centre of the National Agricultual Advisory Service, South Western Province, at Leigh Woods. After being welcomed by the Provincial Director, Mr Colin D. Ross, members saw demonstrations of research being carried out by Mr L. Ogilvie, the Advisory Plant Pathologist, Mr L. N. Staniland, Advisory Entomologist, and by their colleagues, arranged in the laboratories of the Horticultural Science Department of the University. The Centre's mobile laboratory was also inspected.

F. Joan Moore
Secretary, Plant Pathology Committee

THE BRITISH MYCOLOGICAL SOCIETY TRANSACTIONS

Vol.	PART 1	2	3	4	5
1	*m*	*m*	6*s.*	*m*	*m*
2	[		68*s.*		]
3	[		80*s.*		]
4	[16*s.*]	*m*	—	—	—
5	*m*	*m*	*m*	—	—
6	*m*	*m*	(20*s.*)		—
7	(		40*s.*	)	—
8	(		40*s.*	)	—
9	(	20*s.*)	*m*	*m*	—
10	(		40*s.*	)	—
11	(		40*s.*	)	—
12	[		40*s.*	]	—
13	[		40*s.*	]	—
14	(		40*s.*	)	—
15	*m*	*m*	(20*s.*	)	—
16	*m*	[	30*s.*	]	
17	*m*	*m*	(10*s.*)	*m*	—
18	*m*	[	30*s.*	]	—
19	*m*	(	30*s.*	)	—
20	(		40*s.*	)	—

Vol.	PART 1	2	3	4
21	(		40*s.*	)
22	(		40*s.*	)
23	(		40*s.*	)
24	(		40*s.*	)
25	(		40*s.*	)
26	(		40*s.*	)
27	(		40*s.*	)
28	(		40*s.*	)
29	(		40*s.*	)
30	(	Jubilee Vol. 40*s.*		)
31	(		50*s.*	)
32	[	25*s.*]	*m*	*m*
33	(		50*s.*	)
34	(		50*s.*	)

m = out of print, available on microfilm to order
( ) = volume (or part volume) sold separately
[ ] = only sold as part of a long set of volumes

REPRINTS AND MISCELLANEOUS PUBLICATIONS

PLANT PATHOLOGY COMMITTEE: *List of Common British Plant Diseases*, 3rd Ed. 1945. Price net, 5*s*. Postage, 4*d*.

A. A. PEARSON: *Cooke's illustrations of British Fungi* (*Annotations by L. Quélet, R. Maire & C. Rea*). *Ex* Vol. 20, Pt. 1. 1935. Price net, 2*s*. 6*d*. Postage, 3*d*.

T. PETCH: *British Hypocreales*. *Ex* Vol. 21, Pts. 3 & 4. 1938. Price net, 2*s*. Postage, 3*d*.

A. A. PEARSON & R. W. G. DENNIS: *Revised list of British Agarics and Boleti*. *Ex* Vol. 31, Pts. 3 & 4. 1948. Price net, 5*s*. Postage, 3*d*.

J. RAMSBOTTOM & F. L. BALFOUR-BROWNE: *List of Discomycetes recorded from the British Isles*. *Ex* Vol. 34, Pt. 1. 1951. Price net, 5*s*. Postage, 3*d*.

FIFTY YEAR INDEX TO THE TRANSACTIONS, Vols. 1–30; 1896–1946. Compiled by G. R. BISBY. Price net, 21*s*. Postage, 6*d*.

Enquiries and orders for the above to be addressed to

CAMBRIDGE UNIVERSITY PRESS,
200 EUSTON ROAD, LONDON, N.W. 1

or to

CAMBRIDGE UNIVERSITY PRESS
AMERICAN BRANCH, 32 EAST 57TH STREET, NEW YORK 22

FORAY COMMITTEE PUBLICATIONS

(*To be obtained from the Treasurer and on sale at meetings and forays*)

A key to the genera of the agarics and Boleti. By A. A. PEARSON. 32 pp. 1950. Price net, 2*s*. 6*d*. Postage, 2*d*.

Guide to the literature for the identification of British fungi. 1952. Price net, 2*s*. 6*d*. Postage, 2*d*.

CONTENTS

PAGE

New records and observations. V. By A. A. Pearson. (With Plates 2 and 3 in colour) 97

Dispersal of fungus spores by small animals inhabiting wood and bark. By P. H. B. Talbot 123

A study of rusts found on *Pedicularis*. By H. F. Dovaston and C. C. V. Batts. (With Plates 4 and 5, and 15 Text-figures) 129

Predacious fungi from rotten wood. By Sylvia M. Dixon. (With 3 Text-figures) . 144

Masonia, a new genus of hyphomycetes. By George Smith. (With Plate 6) . . 149

Trichocladium Harz. By S. J. Hughes. (With 4 Text-figures) 152

On some hyphomycete spores, including those of *Tetracladium maxilliformis*, from Wheatfen. By C. T. Ingold and E. A. Ellis. (With 2 Text-figures) . . . 158

Fifty-year Index to the *Transactions* 161

Proceedings 1951: Meetings 162
  Annual General Meeting 163
  Accounts: Receipts and Payments 164
  The Marlborough Foray 165
  The Hereford Foray 168
  London and Provincial Forays 176
  The Twenty-fifth Annual Plant Pathology Field Day 176

INSTRUCTIONS TO AUTHORS

Contributors are asked to be clear and concise, and to use a recent issue of the *Transactions* as a guide to the arrangement of headings and subheadings, explanations of plates and figures, references to the literature, and other details. Each paper should start with a short summary.

The standards adopted in the *Transactions* are those outlined in the Royal Society's pamphlet, *General Notes on the Preparation of Scientific Papers* (1950, Cambridge University Press, 200 Euston Road, London N.W. 1, price 2*s*. 6*d*.). An exception is that in the *Transactions* citations of references to literature, although based on the Harvard system, include the full titles of the papers and complete page numbers. Titles of journals are abbreviated in accordance with *A World List of Scientific Periodicals*, 1934.

The scientific names of genera and species are printed in italics and should be underlined in the typescript. The title of the paper, headings, and subheadings may be in capitals, but should not be underlined.

The attention of authors proposing new taxonomic groups is drawn to the need to give an adequate description and figure, and to designate the types as required by the *International Rules of Botanical Nomenclature*. The description of a new species should be accompanied by a figure, and whenever possible the type specimen should be deposited in one of the national herbaria.

The British Mycological Society subscribes to the Fair Copying Declaration, details of which may be obtained from the offices of the Royal Society.

Printed in Great Britain at the University Press, Cambridge (Brooke Crutchley, University Printer)